

NOTICES

OF THE

AMERICAN MATHEMATICAL SOCIETY

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Calendar of AMS Meetings and Conferences

This calendar lists all meetings and conferences approved prior to the date this issue went to press. The summer and annual meetings are joint meetings of the Mathematical Association of America and the American Mathematical Society. Abstracts of papers presented at a meeting of the Society are published in the journal *Abstracts of papers presented to the American Mathematical Society* in the issue corresponding to that of the *Notices* which contains the program of the meeting, insofar as is possible. Abstracts

should be submitted on special forms which are available in many departments of mathematics and from the headquarters office of the Society. Abstracts of papers to be presented at the meeting must be received at the headquarters of the Society in Providence, Rhode Island, on or before the deadline given below for the meeting. Note that the deadline for abstracts for consideration for presentation at special sessions is usually three weeks earlier than that specified below.

Meetings

Meeting #	Date	Place	Abstract Deadline	Program Issue
882	† May 20–23, 1993	DeKalb, Illinois	Expired	May-June
883	† August 15–19, 1993 (96th Summer Meeting) (Joint Meeting with the Canadian Mathematical Society)	Vancouver, British Columbia	May 18	July-August
884	† September 18–19, 1993	Syracuse, New York	May 18	September
885	† October 1–3, 1993 (Joint Meeting with the Deutsche Mathematiker-Vereinigung e.V.)	Heidelberg, Germany	June 17††	September
886	* October 22–23, 1993	College Station, Texas	August 4	October
887	* November 6–7, 1993	Claremont, California	August 4	October
888	* December 1–4, 1993 (Joint Meeting with the Sociedad Matematica Mexicana)	Merida, Yucatan, Mexico	August 4	November
889	* January 12–15, 1994 (100th Annual Meeting)	Cincinnati, Ohio	October 1	December
	March 18–19, 1994	Lexington, Kentucky		
	March 25–26, 1994	Manhattan, Kansas		
	April 9–10, 1994	Brooklyn, New York		
	June 16–18, 1994	Eugene, Oregon		
	August 15–17, 1994 (97th Summer Meeting)	Minneapolis, Minnesota		
	October 28–29, 1994	Stillwater, Oklahoma		
	November 11–13, 1994	Richmond, Virginia		
	January 4–7, 1995 (101st Annual Meeting)	San Francisco, California		
	March 24–25, 1995	Chicago, Illinois		
	November 3–4, 1995	Kent, Ohio		
	January 10–13, 1996 (102nd Annual Meeting)	Orlando, Florida		
	March 22–23, 1996	Iowa City, Iowa		

* Please refer to page 499 for listing of Special Sessions.

† Please refer to the Table of Contents for further information.

†† This date is later than previously published.

Conferences

June 7–18, 1993: AMS-SIAM Summer Seminar in Applied Mathematics on Tomography, Impedance Imaging, and Integral Geometry, Mount Holyoke College, South Hadley, Massachusetts.

June 23, 1993: Symposium on Some Mathematical Questions in Biology on Theories for the Evolution of Haploid-Diploid Life Cycles, Snowbird, Utah.

July 10–August 6, 1993: Joint Summer Research Conferences in the Mathematical Sciences, University of Washington, Seattle, Washington.

July 11–30, 1993: AMS Summer Institute on Stochastic Analysis, Cornell University, Ithaca, New York.

August 9–13, 1993: AMS Symposium on Mathematics of Computation 1943–1993: A Half-Century of Computational Mathematics, University of British Columbia, Vancouver, Canada.

Other Events Cosponsored by the Society

May 30–June 13, 1993: First Caribbean Spring School of Theoretical Physics and Mathematics on Infinite Dimensional Geometry, Noncommutative Geometry, Operator Algebras, and Particle Physics, Pointe à Pitre, Guadeloupe. Cosponsored by the Société Mathématique de France.

July 11–15, 1993: Second World Congress on Neural Networks, Portland, Oregon.

October 15–17, 1993: Second International Conference on Ordinal Data Analysis, University of Massachusetts, Amherst. Cosponsored by the University of Massachusetts, Technische Hochschule Darmstadt, and the Classification Societies of North America and Germany.

Deadlines

	September Issue	October Issue	November Issue	December Issue
Classified Ads*	July 29, 1993	September 2, 1993	September 30, 1993	November 11, 1993
News Items	July 15, 1993	August 20, 1993	September 20, 1993	October 28, 1993
Meeting Announcements**	July 19, 1993	August 20, 1993	September 23, 1993	November 2, 1993

* Please contact AMS Advertising Department for an Advertising Rate Card for display advertising deadlines.

** For material to appear in the Mathematical Sciences Meetings and Conferences section.

NOTICES

OF THE

AMERICAN MATHEMATICAL SOCIETY

ARTICLES

462 Young Scientists' Network Advocacy and an Electronic Newsletter Ease New Doctorates' Job Search Woes

The Young Scientists' Network began when a physics postdoc realized that he and his colleagues faced a far worse job market than they had expected. Setting out to dispel the "myth" of a scientist shortage, he drew attention to the plight of young scientists in the job market and started an electronic newsletter that's now mailed out to 2000 subscribers all over the world. Allyn Jackson reports on the progress of this fledgling organization.

FEATURE COLUMNS

464 Computers and Mathematics *Keith Devlin*

Two reviews on the preparation of mathematical manuscripts make up this month's column. First, John Casti looks at *DVIWind*, a Windows-based screen previewer, and *DVIPSONE*, a printer driver for $\text{T}_{\text{E}}\text{X}$, setting his review in a more general discussion of $\text{T}_{\text{E}}\text{X}$ -fonts. David Hartz then reports on the latest version of *MathType*, Version 3.0.

471 Inside the AMS

This month's column includes a summary of some new e-MATH initiatives for 1993: preprint services and an on-line version of *CMP*.

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NOTICES

OF THE
AMERICAN MATHEMATICAL SOCIETY

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From the Executive Director . . .

FURTHERING RESEARCH

The principal purpose of the AMS is the furtherance of mathematical research and scholarship. This is the mission of the Society, consistent with its founding in 1888 and specifically expressed in its articles of incorporation. As an organization, the Society has a responsibility to design its direction and activities to be accountable to this mission. How does the Society meet this responsibility? What are the goals and the specific activities that further research and scholarship?

Individuals advance mathematical research and scholarship. Therefore the Society should undertake activities that create an environment in which individuals can advance mathematical knowledge and a culture that nurtures and encourages the development of individual talent.

Traditionally, the activities of the Society in support of its mission have revolved around the publication of mathematical research and the sponsorship and organization of meetings and conferences. The original "call to mathematicians" establishing the Society was a request to organize meetings; shortly thereafter, publications of the presentations and events of these meetings led to the publication program of the Society. Over time the mathematics community has looked to the Society for various sorts of information about the mathematical sciences. The direction and activities of the Society, while expanding considerably in volume, have remained basically the same. The Society has supported the furtherance of mathematical research and scholarship primarily through the communication of research mathematics.

Today, dramatic changes are taking place in the way mathematics is done, in the uses of mathematics, in information distribution and exchange, in the role played by a publisher, and, in general, in the influence of technology on our daily lives. The Society provides a forum for the community to discuss the impact of such changes on mathematical research and scholarship. With its strong collective representation, it is a venue for building consensus about which directions and actions need to be taken to respond to the changing environment. The AMS provides the organization and mechanism for the difficult task of identifying goals that further mathematical research, sifting through possible actions to achieve those goals, considering which actions make the best use of resources, and evaluating the outcome of those actions. Indeed, direction and appropriate actions to further mathematical research and scholarship do not happen by chance.

During recent planning activity, the Society reaffirmed that publications and meetings help to advance interest in mathematical research and scholarship. It also was reasoned that this interest is served through advocacy, advancing the status of the profession, and fostering an awareness and appreciation of mathematics. Furthermore, it was recognized that the furtherance of mathematical research and scholarship is deeply rooted in the connection of mathematics with its uses and with education.

Publication and meetings activities are being closely examined to see how they can better serve the mission of the AMS. An active and broadened acquisition activity has been introduced into the publication program. The Society is acquiring more research monographs, has introduced a graduate text book series, and is publishing information to bring awareness of research mathematics to a broad audience. The AMS Committees on Science Policy and on Education have set forth plans and actions for the AMS regarding these critical areas. The Society will be actively engaged in speaking about mathematics in federal science policy matters and in federal support of science and technology. These plans include development of specific mechanisms to assist academic departments of mathematics in planning and in working with their administrations on resource allocations, as well as actions directed at issues involving undergraduate and graduate student affairs. New "policy committees" have been formed on publications, meetings and conferences, and on issues of the profession to complement those that exist in science policy and education. These policy committees will take the long-range view and will recommend ways for the Society to carry out its mission. Specific plans and activities of the Society may be found in its annual operating plans.

The furtherance of mathematical research and scholarship requires moving in several different directions and taking numerous actions. The Society is pursuing this mission in an aggressive and broad, yet thoughtful, fashion.

William Jaco

Letters to the Editor

Flat-Rate Research Funding

As a young American mathematician (Ph.D. 1990, University of Chicago), let me say that I am disappointed in the response of the AMS concerning the flat-rate funding system for the mathematical sciences. The opinion written by Robert Molzon (January 1993 *Notices*) gives a good rebuttal to the "cheap science" arguments. I would rather discuss the issue raised by John Polking that the lack of American citizens receiving Ph.D.s in mathematics is linked to this issue. I believe these arguments are particularly damaging to the community at large.

First, let me give some of my background. Since completing my Ph.D. I spent two years as a research instructor at Michigan State University, and presently I am an NSF postdoctoral fellow at Ohio State University. The past three years I have been on the job market and have had exactly one offer (the research instructorship at Michigan State). Moreover, at present I am seriously considering leaving academe and my research specialty because of the difficulty of providing for my family while working in a series of temporary jobs with no end in sight. I am not unique. In fact, I am one of the lucky ones.

The most important issue to young mathematicians and graduate students is *not* NSF funding; it is the job market. It seems unlikely to me that the flat-rate proposal will decrease the number of jobs even in the long term, and certainly it could not do so significantly. Moreover, I have known very few capable mathematics students who chose other disciplines for monetary reasons, and it is unlikely that a student whose primary motivation is monetary will be enticed into mathematics over engineering until industry has an equal number of job openings for mathematicians as for engineers at equal pay. On the other hand, a sure way to scare students off of mathematics is to have a job situation where math Ph.D.s cannot find

jobs in academia and are unprepared for anything else.

Many in the discipline (and seemingly the AMS) have been taking the younger mathematicians for granted. As a younger mathematician, I can say that many of us are starting to come to grips with the fact that we will probably be forced to leave the mathematical community to find a job. Unfortunately, some of us are leaving with a bitter taste in our mouths left by the community's inattention to our problems. Some question the good faith of those who continued to decry the lack of Ph.D.s in mathematics at a time when the job market had many more applicants than jobs. Were these studies for the benefit of the mathematical community at large, or merely to protect funding? I hope the former, but many of us are unsure. I do not argue that the AMS should find us all jobs. I merely request that we be treated with respect. It does not help that the AMS uses the "need" for American Ph.D.s in funding battles that aren't likely to have much impact on the need, nor does it help that the AMS gives the appearance of acting only for the "haves".

With the change in the administration, this is the ideal time to try to change how mathematical research is funded. We are not like other scientists, and pretending that we are does not help us. Unlike chemistry or other sciences, we cannot see the end of a project nor even tell where a result is likely to lead. Moreover, mathematical research which initially seems to have no bearing on physics or chemistry often turns out (to everyone's surprise) to be very useful to other disciplines. Thus, it is in the best interest of science to fund as wide a range of mathematical research as possible and as many investigators as possible. If the only way to get the NSF to do this is flat-rate funding, then it must be done. If not now, when will we be able to affect how mathematics is viewed by the NSF? If not this, what? There are limited funds; we must trade something for broader research support.

I do not say this plan is perfect, but let us not pretend that we are the same as other scientists, and let us not pretend that this too is a question that

will change the type of students we see in graduate school.

Curtis D. Bennett
The Ohio State University,
Columbus
(Received January 14, 1993)

It is hard to take seriously John Polking's assertion that flat-rate funding by the NSF would eventually lead to fewer people being attracted into the mathematical sciences. The field cannot possibly be made more attractive to newcomers by supplementing the salaries of a few already well-paid, established mathematicians while making funding nearly impossible for a young mathematician with a promising but not yet completely developed research program.

Conrad Plaut
The University of Tennessee,
Knoxville
(Received January 19, 1993)

I am writing in response to the essay by John C. Polking opposing flat-rate funding by the NSF (*Notices*, January 1993). He seems to argue that shifting to a flat-rate system will reduce the total amount of funding which is available, thereby hurting the mathematical community as a whole. Since a flat-rate system is just another method for allocating a given pool of resources, there is no reason to believe that if the mathematical community continues to press for an overall increase in funds the method chosen for

Letters to the Editor

Letters submitted for publication in the *Notices* are reviewed by the Editorial Committee.

The *Notices* does not ordinarily publish complaints about reviews of books or articles, although rebuttals and correspondence concerning reviews in *Bulletin of the American Mathematical Society* will be considered for publication.

Letters should be typed and in legible form or they will be returned to the sender, possibly resulting in a delay of publication. All published letters must include the name of the author. Letters which have been, or may be, published elsewhere will be considered, but the Managing Editor of the *Notices* should be informed of this fact when the letter is submitted.

The committee reserves the right to edit letters.

Letters should be mailed to the Editor of the *Notices*, American Mathematical Society, P. O. Box 6248, Providence, RI 02940, or sent by e-mail to notices@math.ams.org, and will be acknowledged on receipt.

disbursing them will have any impact. His comparison to the 1970s is not appropriate since he acknowledges that at that time mathematicians asked for less, not more, money.

Further, I would like to challenge his assertion that this change in the funding system would hamper efforts to attract good students. As an advanced graduate student, I find this argument carries no weight. When I was applying to graduate school, I knew absolutely nothing about the intricacies of research funding—I naively believed that I would get a Ph.D., get a job at a university, and that would be my source of money. Even now, as I enter the job market, I do not have a good grasp of the Byzantine world of outside funding and its importance to my career. Based on conversations with other graduate students, I think that I represent the norm.

David Cruz-Uribe, SFO
University of California,
Berkeley

(Received February 9, 1993)

New Results vs. Exposition

I recently submitted a manuscript for publication to the *Bulletin*. It was rejected with the following quote from one referee: "One might tell him that elementary results couched entirely in his own nonstandard notation won't be read by anyone". I have had papers rejected before, but never with such insulting language.

My complaint, however, is more general. Mathematical journals will publish anything that contains "new results", especially "deep" new results, no matter how obscure, incomprehensible, and insignificant outside a very narrow "field". However, new perspectives, insights, ideas, and concepts, especially if they span more than one "field", have a very hard time gaining respect. They tend to be dismissed as "elementary", having "nonstandard notation", or being "just" about terminology, as if notation and terminology were not inextricably linked to concepts and hence not important. In my career I have been more interested in insights and concepts than in "results". (Some concepts I introduced have become accepted; for example, "Constitutive Theory" and "Simple Materials" are

now classifications in *Math. Reviews*.) In my book *Finite-Dimensional Spaces, Algebra, Geometry, and Analysis* I have tried to bring together several fields and to clarify their basic concepts. The *Bulletin* never reviewed my book, perhaps because it did not pass the censors that enforce "standard notation".

The purpose of my rejected paper was not to present any deep "results" but to show how a variant of the concepts of category theory introduced by Eilenberg and Mac Lane can be used to improve the infrastructure of mathematics in general and differential geometry in particular. Considering infrastructure, however, appears to be against the party-line of the mathematical establishment, which seems to prefer to continue in its present rut and be interested only in heaping "results" upon "results" in narrower and narrower "fields", to the exclusion of anything else.

Under the circumstances, I wonder why I should continue membership in an organization that is dominated by people who are not willing to give a fair hearing to my views of what mathematics is all about.

Walter Noll
Carnegie Mellon University
(Received September 8, 1992)

Response from Richard S. Palais, *Bulletin* Editorial Committee:

Dear Professor Noll,

I am truly sorry that you took offense at some wording in my letter of July 24, declining to accept your paper "Isocategories and Tensor Functors" for publication in the Research-Expository Papers section of the *Bulletin*. On the other hand, I find it very hard to understand how you can characterize the referee's comment that I quoted to you as in any way "insulting". It was in my view a quite matter of fact statement that summarized succinctly what this referee and a number of other readers felt about your paper.

It is never a pleasant task when an editor feels he must turn down someone's paper. One knows that inevitably the author's feelings will be hurt. After all, every editor has probably also been on the receiving end of at least one

such letter and will recall the blow to one's ego it always brings. Of course one can take the easy way out and speak vaguely of some standard not met or too big a backlog. On occasion I have done that, but, whenever possible, I feel that an author deserves some explanation of the reasons for a rejection, if for no other reason than to help him see, in the opinion of the editor and referees, what might improve the content and/or the exposition of his or her papers. So if the referee's criticisms are specific and constructive, I try to let an author know what they are. In the case of your paper there was in fact a unanimous feeling that the paper was too much about formalism and notation, without enough indication of how its reformulation of old concepts in new and different terminology might be mathematically useful and help to understand old ideas more clearly. The comment I quoted simply stated this opinion in wording that I find in no way "insulting".

Finally, let me address your more general criticism of the state of mathematical publishing. I believe that there is a much wider spectrum of editorial policy than your letter would suggest. As you point out, there are indeed many journals where deep new results are the *sine qua non* for acceptance, but I personally feel that is fine as long as these journals do not completely dominate the mathematical publishing landscape. Looking around I also see a number of journals with editorial policies that do encourage good exposition. I would of course like to think that the *Bulletin* is one of these, and I assure you that I and my board of associate editors will continue striving to make this so.

Richard S. Palais
Brandeis University
(Received September 15, 1992)

An Agenda for the AMS

With the exception of an attitude adjustment needed at the NSF towards research funding for mathematics, there are two problems facing academic mathematical sciences departments that I believe are more relevant than the litany of supposed woes claimed by the Executive Director of the AMS, William Jaco, in his column in the September

1992 *Notices*. These are (1) the fierce pressures to lower standards (all in the name of "good teaching" and "student retention", of course) in the undergraduate mathematics curriculum and thereby to join the humanities' faculties who have progressed far down the road of grade inflation, and (2) our insistence on bringing social agendas to bear in academics in general, and mathematics in particular.

Many fine mathematicians, including past presidents of the AMS along with a number of former and current council members, are among those pushing social agendas, while a seemingly infinite sequence of self-styled "teaching experts" are aiding the forces of grade inflation (and their own aggrandizement), publishing such condescending, self-righteous baloney as the "NCTM Standards" and "Everybody Counts". Of course, the two problems are also fueled by the voracious appetite that modern universities have for money. It is my hope that many of us with seniority and heavily involved in research will (at least) quietly resist these pressures and will also help stifle the latter much of the Society has worked itself into over things (see Jaco's column) better left to individuals.

Wilbur Whitten
The University of
Southwestern Louisiana
(Received February 1, 1993)

Helping Mathematicians in Developing Countries

While we are going through difficult times in this country, those in countries with less resources are in much more desperate circumstances. In an article published in these *Notices* in November 1991, Neal Koblitz summarized the plight of mathematicians in developing countries and also suggested ways in which members of the Society can help them. The problems faced by mathematicians in nonmetropolitan countries seem to be specific to the regions in which they live. Neal suggested to me that it would be appropriate to form groups which would attempt to help particular regions. Since I have had the experience of living and teaching

in the Caribbean, I am trying to form such a group which would relate to the Caribbean basin, including Central America and the Guyanas.

A major difficulty for those in the smaller countries in this region is that communications are on the whole good between a country and its ex-ruling power and poor laterally, especially if the languages are not the same. A young mathematician is often faced with a choice of remaining at home in relative isolation and with very little recognition or leaving to work in a country where they feel marginal. If a regional grouping could be achieved which would be able to pool resources this would be a very important step. A major aim would be to institute an annual conference for the entire region. Other less conspicuous tasks could be the donation of books and journals.

I have already received positive feedback on this idea. I am appealing to those members of the Society who would be interested in being part of such a group to communicate with me. It would be especially useful if those who are either from the region or who have lived in it could contact me.

Ken Johnson
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(Received January 25, 1993)

AMS and MAA Motions on Denver

I am writing to express my disappointment with a resolution passed by the governing boards of the AMS and the MAA regarding a possible change in venue for the 1995 annual meetings. First, let me say that after discussing the issue with Michael Artin, Marcia P. Sward, and others at the San Antonio meetings, I understand the decision to try to move the meetings, and I am not opposed to such a change.

My disappointment in the matter stems from the wording of the resolution. The resolution states that the actions taken by the voters in Colorado were "wrong". Whether or not we agree

with this statement, the AMS and the MAA have no business taking a political stand on a nonmathematical issue, especially an issue as volatile as this one. In my opinion, this resolution clearly steps outside the bounds of propriety. Such a political statement is unnecessary; the meetings can be moved without taking an official stand that has the potential to alienate a significant number of individuals within the mathematical community. Politicization of the AMS and the MAA should be avoided at all costs if the two organizations are to keep their focus on their true mathematical missions.

Although it may be too late to change the wording of this resolution, I hope that any other public statements by the organizations regarding this issue can be made in a politically neutral manner. I also hope that in the future more care will be taken regarding such issues.

Bryan Dawson
Emporia State University
(Received January 29, 1993)

Editor's Note: Following is a response from Ubiratan D'Ambrosio to the letter from William Waterhouse that appeared in the April 1993 issue of the *Notices*, p. 324.

Ethnomathematics

[I have] [n]o quarrel with Professor Waterhouse in this forum. I only regret that in this *Notices* article I cut what I have been writing in most of my papers, referring explicitly to an "etymological abuse" used in coining the word ethnomathematics. The root *mathema* (*mathemata*) is indeed a difficult one. The abuse, encouraged by consulting P. Chantraine's *Dictionnaire Etymologique de la Langue Grecque*, was induced by trying to recognize mathematics in the complexity of Greek thought. It is clear that this etymological abuse implies challenging the accepted interpretations of Greek mathematics. Indeed, this is the intention.

Ubiratan D'Ambrosio
State University of Campinas,
Brazil
(Received March 29, 1993)

Young Scientists' Network

Advocacy and an Electronic Newsletter Ease New Doctorates' Job Search Woes

Back in 1990 Kevin Aylesworth started worrying. A physics postdoc at the Naval Research Laboratories in Washington, DC, he wondered what he would do when his two-year position ended—especially when he started talking to other postdocs who were just finishing up. Despite publicity about a “scientist shortage” that was supposed to hit in the 1990s, these people were having trouble finding jobs. “What surprises me most is that even those young people with outstanding research records are having difficulty finding permanent employment,” Aylesworth wrote in a letter to the editor in *Physics Today*. “This situation has also come as a surprise to many of my peers, who entered graduate school six or more years ago when the employment situation appeared to be much brighter.” Now, just four years after finishing his doctorate, Aylesworth has left physics and works as a legal assistant in Cambridge, Massachusetts. Like many of his colleagues, he couldn't find a job in his field.

Before he left science Aylesworth decided to try to do something about the “myth” of the scientist shortage and to focus attention on the poor job market. Aylesworth founded the Young Scientists' Network (YSN), an informal network that provides advocacy for new (though not necessarily young) scientists. Its goals are (1) to let the press, the public, and government officials know that there is no shortage of scientists—there is, in fact a glut; and (2) to discuss how young scientists can find both traditional and nontraditional careers despite the oversupply of scientists and engineers. The activities of YSN have been covered by American Public Radio, the *Chronicle of Higher Education*, the *Electrical Engineering Times*, and *Science* magazine.

One of the main activities of YSN is its electronic newsletter, the *YSN Digest*, through which young scientists in all fields can exchange information on just about anything that newcomers to science might be wondering about: job hunting, salaries, federal research support, affirmative action, problems with advisors. John Sahr of the electrical engineering department at the University of Washington in Seattle is the editor of the *Digest*, which is sent out six times a week. He gets help from a couple of other editors who produce a shorter, moderated version of the *Digest*. Subscriptions have risen steadily, from about twenty in July 1990, to around 180 about a year ago, to nearly 2000 as of March 1993. YSN is run entirely by volunteer efforts, and there are no dues to

join or to subscribe to the *Digest*.

Although there are a few job postings in the *Digest*, it is not a job listing service. Most postings seek or give advice, provide information, or tell a personal story. A recent posting described the difficulties of a young postdoc who wondered if she could publish her research results on her own, without her laboratory supervisor's name on the paper—evidently he was ignoring her results, which were intriguing, and diverting her to other, less interesting projects. Another posting on affirmative action prompted a heated debate and requests to hold down the “flaming” (in YSN, to be “flamed” means to be castigated or insulted on the network for one's posting; there are also references to putting on and taking off an “asbestos suit” to let readers know when a particularly inflammatory opinion is coming up). There have been discussions of the merits and demerits of the Superconducting Supercollider, President Clinton's plans for support of science, the particular problems women face in science, the possibilities for employment in industry, and the legality of discrimination in hiring at religious academic institutions.

In addition to publishing the *Digest*, YSN has worked to focus high-level attention on the poor job market young people face in science. Aylesworth has brought YSN concerns to the attention of the upper echelons of the Office of Science and Technology Policy, the National Science Foundation (NSF), and the American Physical Society (APS). Last year he worked with Congress to help expose flaws in a much-vaunted NSF study predicting an impending shortage of scientists; in the late 1980s this study was used by former NSF director Erich Bloch to argue for large increases for the Foundation. After a petition drive YSN now has enough signatures to put four YSN candidates on the ballot for the upcoming elections for officers of the APS. The group seems to be shaping up as a significant political force, particularly in the physics community.

There have been some reservations about the fact that YSN encourages “whining” by people dissatisfied with their job prospects (and a certain amount of whining inevitably takes place in the *Digest*). A number of postings have exhorted YSN members to “get real” about their prospects in the job market and not expect that they are automatically entitled to a job just because they've finished a Ph.D. But most of the subscribers seem to appreciate the completely open format in

which people can vent their frustrations and get some support. Many have taken solace in knowing that they're not the only ones having trouble finding a job.

In a recent posting one subscriber described how YSN had helped him when the "stigma of failure" began to drain his enthusiasm and creativity. "I spend so much of my time alone working on my dissertation or my job search that I know my computer better than my own family," he wrote. "I'm not around other grad students much and, in my line of research (MRI), I spend a lot of time doing experiments (alone) during off-hours in the bowels of an inner-city hospital (across the hall from the morgue). I almost lost my enthusiasm for research altogether (not to mention my self-esteem) in the face of this sacrifice. The personal accounts subscribers post in YSN have done a lot to quiet my frustrations and soothe my anxieties." Most importantly, he says he's had a couple of interviews, has received one offer, and sees the prospect

of a couple of interviews for permanent positions. As he put it, "Although my job search is far from over, my spirits are decidedly more upbeat."

To have information about YSN sent to you automatically, send an electronic mail message with the subject line "help" or "send info" to: ysn-request@zoyd.ee.washington.edu. You can subscribe to YSN automatically by sending a message with the subject line "subscribe"; to unsubscribe, use the subject line "unsubscribe". If you have general questions about YSN, write to the editor of the YSN Digest, John Sahr, ysn-adm@zoyd.ee.washington.edu. Sending a message to the address ysn@zoyd.ee.washington.edu broadcasts the message to the entire YSN membership. Back issues of the Digest are available through anonymous ftp to lupulus.ssc.gov, cd/lysn.

Allyn Jackson

CONTEMPORARY MATHEMATICS

The Madison Symposium on Complex Analysis

Edgar Lee Stout and Alexander Nagel, Editors

Volume 137

This volume contains the proceedings of a Symposium on Complex Analysis, held at the University of Wisconsin at Madison in June 1991 on the occasion of the retirement of Walter Rudin. Among the main subjects covered are applications of complex analysis to operator theory, polynomial convexity, holomorphic mappings, boundary behavior of holomorphic functions, function theory on the unit disk and ball, and some aspects of the theory of partial differential equations related to complex analysis. Containing papers by some of the world's leading experts in these subjects, this book reports on current directions in complex analysis and presents an excellent mixture of the analytic and geometric aspects of the theory.

1991 *Mathematics Subject Classification*: 30, 32; 42, 47

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Computers and Mathematics

Edited by Keith Devlin

Editorial policy

People sometimes ask me what is the criterion used in accepting software reviews for publication in this column? How do I, as editor, evaluate the “impartiality” of the reviewer? The simple answer is I do not try to make such an evaluation. I am not even sure it is possible—ever; the very phrase “impartial review” strikes me as an oxymoron.

What I do ask is that a reviewer puts on record, displayed prominently in the review or in the reviewer footnote that accompanies each review, any fundamental preferences for particular kinds of software, and any affiliation, either present or past, with a developer of software similar to, or in competition with, the software being reviewed.

In the case of comparative reviews the reviewer should also make clear any inequalities of experience between the systems being considered.

Beyond that, and a general request to strive for fairness, it is up to the reviewer. The final editorial decision is, in principle, a simple one. If the review seems likely to be of benefit to readers of the *Notices* it is published. I take it that *Notices* readers are a particularly well-educated bunch, more than capable of judging the value of a particular review, as long as they know where the reviewer is coming from. As column editor, I see my role as a conduit, not a filter. The only filtering that is done is when a reviewer reports that a particular piece of software is so poorly designed or badly written that it seems unlikely to be of use to anyone, then the column contains no mention of that package, at least in its form at the time. Thus the column does not publish completely negative reviews.

Of course, just as I ask reviewers to make their own position clear, the column editor should, from time to time, explain the editorial policy concerning reviews. I just did.

This month's column

Two reviews on the preparation of mathematical manuscripts make up this month's column. First, John Casti looks at *DVIWindo*, a Windows-based screen previewer, and *DVIPSONE*, a printer driver for \TeX , setting his review in a more general discussion of \TeX -fonts. David Hartz then reports on the latest version of *MathType*, Version 3.0.

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Reviews of Mathematical Software

Bitmap-free \TeX

Reviewed by John L. Casti*

Devotees of DOS and OS/2 notwithstanding, it's becoming ever more clear that the marketing muscle of Microsoft is turning Windows into the graphical-user interface (GUI) of the foreseeable future. Trying to ignore this development is like trying to ignore a *Tyrannosaurus rex*. In fact, even in the cloistered world of \TeX aficionados this message seems to be finally getting through.

DVIWindo is a Windows-based screen previewer for viewing \TeX DVI files created by any standard implementation of \TeX . The program uses outline font rendering technology, suitable for on-screen display in Windows 3.x running in either standard or enhanced mode. As a result, the program must be run on a machine having at least an Intel 80286 processor. *DVIWindo*, together with its companion Postscript printer driver discussed below, is marketed by Y&Y, Inc., 106 Indian Hill, Carlisle, MA 01741, 508-371-3286. Since both of these programs call for fonts used in the \TeX DVI file to be available in outline form, let me preface this review with a few words about font formats.

Consider the character lowercase “a” in a particular typeface like Computer Modern Roman (cmr) at a particular point size, say 10pt. To print or see this character in a \TeX document, there must be a file for the font cmr10 that contains this character. There are two completely different philosophies as to how to create this font file: *bitmap* and *outline* (or *vector*) format.

Typical \TeX installations keep the font files as bitmaps. In this format, the character “a” is represented by a rectangular

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grid in which the appropriate cells are either “on” (black) or “off” (white). Thus each character in the font is stored as a grid (raster) of this type, with the entire collection of characters forming the font file (`cmr10` in this case). The size (i.e., resolution) of the grid is chosen to be compatible with the output device, typically 300 or 600 dots per inch (dpi) for home laser printers and 118dpi for screen previewing. It’s clear from even this cursory description that if you want to have access to a lot of typefaces at many different point sizes, you’re going to have to have a lot of these individual rasters stored somewhere on your system. Moreover, if you want to do funny things with the characters like rotate them, fill them in with a pattern other than pure black, or place shadows behind them, then you must create a completely new raster for each special effect. In essence changing an existing character this way effectively creates an entirely new character insofar as bitmap representations are concerned. Outline fonts do away with all these storage and character manipulation difficulties.

The philosophy behind outline fonts is to represent each character in a given typeface by a mathematical formula. This formula expresses the outline of the character. Thus, for example, there is one and only one formula for lowercase “a” in the typeface `cmr`, and similarly for each character in any other typeface. So if you want that character at 10pt, 12pt, or 11.723pt, you just apply the appropriate scale factor to the standard formula for the character. In short you can scale and rotate a character simply by manipulating its mathematical representation. Moreover, the other effects noted above can also be easily implemented by using the same formula. So, in summary, by moving to outline fonts you not only save on computer storage, but you gain enormous flexibility in the types of effects you can introduce into your \TeX document. Now back to *DVIWindo*.

The *DVIWindo* package provides the \TeX user with what can only be described as the “Cadillac” of screen previewers. In fact this previewer has so many nice features that it’s almost worth installing Windows to use it—even if you have no other need for this kind of GUI. For reference the figure on the following page shows a typical page of math as it might be previewed on your screen in *DVIWindo*. In addition to the features one has come to expect from any decent \TeX previewer—zooming in and out, string search capability, page skipping, two-up viewing, and page borders—here we find a plethora of additional features found in few, if any, of the other previewers I’ve examined. Let me list just some of these additional features.

- *Storage requirements:* To give some idea of the storage requirements involved with bitmap versus outline fonts, a typical \TeX installation requires between 10 and 20 million bytes of hard disk space to store all the Computer Modern fonts in bitmap format at various sizes and resolutions. By way of comparison, the complete set of seventy-five Computer Modern fonts in the industry standard Adobe Type 1 format occupy only around 2 million bytes; this comparison can only get worse as 600dpi printers and higher resolution screen drivers become more readily available.
- *Graphics insertions:* One of the biggest drawbacks to \TeX is the clumsy manner by which graphics files are inserted into documents by the \TeX `\special` command. This unhappy situation is further compounded by the fact that there is no standard way of doing this. As a result, most device drivers have their own characteristic way of using the `\special` command to insert graphics files. *DVIWindo* allows the user to employ any of the **ten** most popular of these insertion routines for including Postscript graphics files. Moreover, if the graphic includes a low-resolution TIFF header file, *DVIWindo* will display this graphic in the preview, allowing the user to see how the actual figure will appear when printed at higher resolution.
- *Text shaping:* Sometimes it’s useful to be able to see how the text is laid out on the page without wanting to see each individual character. This is often the case when, for example, you want to balance out the length of text on two pages that are to be viewed side-by-side or when you just want to quickly check for orphans and widows (single lines appearing at the top or bottom of a page). *DVIWindo* allows the option of doing this, which as a by-product greatly reduces the amount of time needed for Windows to compose the page.
- *Font information:* Suppose you’re debugging a file and want to know what font \TeX thinks you’re using. With *DVIWindo* it’s a snap to get such information. Just call up the Font Information window and click on the character in question. You can also go the other way around: click on a particular font in the Font Information window, and the program will immediately highlight every character on the page that’s typeset in that font. This capability is especially useful when a document uses a lot of fonts at similar point sizes and you want to make sure that \TeX is using exactly the right font at the right place at the right size.
- *Color-coded rules and fonts:* If you’re previewing on a color monitor *DVIWindo* supports some pretty special `\special` commands of its own. These allow you to add color to a document’s fonts and rules. This added capability can come in handy if, for instance, the document is something like a technical manual that’s only intended to be viewed on screen. Of course, the utility of color-coding elements in this way may be of great value if you happen to have a color Postscript printer sitting around the office. In either case *DVIWindo* is the only \TeX screen driver I know about that allows you to liven-up your file with splashes of color.
- *Ruler:* Sometimes it’s desirable to be able to measure on the screen exactly how much space is needed to move some block of text or a figure in order to get it placed “just right”. *DVIWindo* includes a very convenient scheme for making precise measurements of horizontal and vertical spacing on the screen, a feature that other previewers have also implemented, but not with the high-resolution scale available with *DVIWindo*.

DVIWindow [chronib.dvi] dM page: 1

File Preferences Previous! Next! Unmagnify! Magnify! Fonts

Page Size...

Ruler Units...

Spread ^E

Use Count0 ^U

Landscap ^L

Grey Text ^G

Text + Grey ^Y

Reset Scale Each File

Reset Scale Each Page

Ruler Dimensions True

Draw Page Border

Draw Text Outline

Complain Missing Fonts

Complain Bad Specials

Ignore All Specials

Pass Through EPS

Save Preferences

TeX output 1992.07.19:2135

Pages 1

Fonts 9

Bytes 6082

Magnification 1.200

Max Height + Depth 542 pts

Max Width 391 pts

Max Stack Depth 13

DVI Version 2

Scale Numerator 25400000

Scale Denominator 473628672

Symmetry in the Coplanarity

Write the triple product using

$$t = \mathbf{i} \cdot \mathbf{d} \cdot \mathbf{q} \mathbf{\ell} = \mathbf{i} \cdot \mathbf{q} \mathbf{\ell} \mathbf{d}^* = \mathbf{q} \cdot \mathbf{i} \mathbf{\ell} \mathbf{d}^*$$

$\mathbf{\ell}^* = -\mathbf{\ell}$ and $\mathbf{i}^* = -\mathbf{i}$, since \mathbf{i} and $\mathbf{\ell}$ are orthogonal, we obtain

$$t = \mathbf{i} \mathbf{q} \cdot \mathbf{d} \mathbf{\ell}$$

Components of $\mathbf{q} = (q, \mathbf{j}, \mathbf{k})$ and $\mathbf{d} = (d, \mathbf{i}, \mathbf{j})$

$$\mathbf{q} \cdot \mathbf{d} = (q, \mathbf{j}, \mathbf{k}) \cdot (d, \mathbf{i}, \mathbf{j}) = dq - \mathbf{j} \cdot \mathbf{j} = dq - 1$$

$$\mathbf{q} \cdot \mathbf{\ell} = (q, \mathbf{j}, \mathbf{k}) \cdot (\mathbf{d} \cdot \mathbf{\ell}) = (dq - \mathbf{j} \cdot \mathbf{j}) (\mathbf{\ell} \cdot \mathbf{d}) + d \mathbf{j} \cdot \mathbf{j} \mathbf{\ell} + q \mathbf{k} \cdot \mathbf{k} \mathbf{\ell}. \quad (3)$$

$$\mathbf{s} = \sum_{i=1}^n w_i e_i (\mathbf{i} \cdot \mathbf{d} \mathbf{\ell}^*) \quad \text{and} \quad \mathbf{i} = \sum_{i=1}^n w_i e_i$$

so still have the three equations

$$\mathbf{q} \cdot \delta \mathbf{q} = 0, \quad \mathbf{d} \cdot \delta \mathbf{d} = 0, \quad \text{and} \quad \mathbf{q} \cdot \delta \mathbf{q} = 0$$

all of which we can write in the matrix form

$$\begin{pmatrix} A & B & \mathbf{q} & 0 & \mathbf{d} \\ B^T & C & 0 & \mathbf{d} & \mathbf{q} \\ \mathbf{q}^T & 0^T & 0 & 0 & 0 \\ 0^T & \mathbf{d}^T & 0 & 0 & 0 \\ \mathbf{d}^T & \mathbf{q}^T & 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} \delta \mathbf{q} \\ \delta \mathbf{d} \\ \lambda \\ \mu \\ \nu \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

Fonts Used	
Name	Size
LBDX	at 11.4 pt
LBDX	at 13.4 pt
LBME	at 11.4 pt
LBMO	at 8.3 pt
LBMO	at 11.4 pt
LBMS	at 8.3 pt
LBMS	at 11.4 pt
LBRX	at 8.3 pt
LBRX	at 11.4 pt

- *Windows Clipboard*: As Windows becomes more and more a de facto GUI standard, an ever-increasing number of users will make use of other Windows document-processing programs. *DVIWindo* allows you to select particular portions of a given \TeX page and copy it to the Windows Clipboard, where it can then be imported “as is” into programs like *Microsoft Word*. One way to use this capability, for example, would be to create the textual material of your document in *Word*, then use the unparalleled mathematical typesetting capability of \TeX to typeset equations or other mathematical objects. These equations could then be previewed in *DVIWindo*, from which the Clipboard capability could be used to transfer them into the target document.
- *Changes in the \TeX source file*: *DVIWindo* notices when a DVI file changes and redisplay it. This feature allows you to edit the \TeX source file in one window, while showing the typeset page in another. With this capability the much-ballyhooed but vastly overrated WYSIWYG (“what you see is what you get”) features of competing programs disappear like a trickle of water in the desert. Besides, no serious \TeX ’er needs WYSIWYG anyway. WYSIWYG is for wimps!

OK, I think you get the idea. I’m a fan of *DVIWindo* and I think you will be too, once you try it. But for the sake of completeness there is one minor annoyance that should be pointed out.

The principal nuisance feature of *DVIWindo* is the lack of any on-screen Help. While the manual is excellent and the number of commands pretty small, it’s still awkward to have to thumb through the manual when you forget the exact combination of keystrokes and mouse clicks needed to execute a seldom-used command. Besides, on-line Help is almost *de rigueur* in genuine Windows applications nowadays, in any case.

This is really a complaint of little consequence when measured against the many sterling features of *DVIWindo* so I won’t belabor it. Let me now move on to consideration of the printer driver *DVIPSONE*, which in many ways is the direct complement of the screen previewer.

Printing in Style

Screen previewing is one thing; printing is something else again. The fact is that about $99\frac{44}{100}\%$ of all \TeX jobs are ultimately destined to be presented in hard copy. So whether you’re creating a short letter or a multivolume technical treatise, it all boils down to how fast you can get a nice-looking hard copy out of your printer. This is where *DVIPSONE* comes into play.

DVIPSONE is a DOS-based printer driver that produces resolution-independent, page-independent Postscript output from \TeX DVI files. Like *DVIWindo*, this printer driver is also designed to use any outline font that can be rendered in Adobe Type 1 format, although in a pinch the program also admits the possibility of using bitmapped fonts too. *DVIPSONE* realizes the dream of real device independence: the *same* file used for proofing on a low-resolution laser printer can be sent

to a high-resolution phototypesetter. That very *same* file can also be used for on-screen previewing (with *DVIWindo*) at arbitrary magnification.

Another feature of major importance built in to *DVIPSONE* is partial font downloading. In documents calling for many fonts this can reduce the size of the Postscript file by a factor of between 4 and 8. Thus the time needed to copy the file to the printer is greatly reduced, as is the likelihood of running out of virtual memory space on printers with small memories.

As with *DVIWindo*, *DVIPSONE* also supports the ten most popular schemes for inclusion of Postscript graphics via the \TeX `\special` command.

A somewhat more technical, yet still extremely important, feature of *DVIPSONE* is that there is no approximation of coordinates. Consequently, positioning of characters and rules will be as accurate as the output devices allow.

There are other attractive advantages to using *DVIPSONE* as a printer driver too, including the fact that the program gets all of its font metric information directly from the outline font itself. This means that the program has no need at all for the \TeX TFM files. A seemingly minor point, right? Yes, but it can quickly become a major advantage if, for example, there is a mismatch between the TFM file used at an author’s home base for creating a DVI file and the TFM file used by the DVI printer driver at a service bureau that’s processing the file on a high-resolution imagesetter. Such mismatches cannot occur with the output produced by *DVIPSONE*.

I should add in closing this discussion of the printer driver that *DVIPSONE* can be used in conjunction with *DVIWindo* to print directly from the previewed file in Windows. This procedure allows the user to bypass the notoriously slow and inefficient Windows Postscript printer driver, wheeling in the vastly superior routines built in to *DVIPSONE*. The speedup in printing by using *DVIPSONE* instead of the generic Windows driver is truly astonishing. It’s just a pity that *DVIPSONE* can’t be used for printing other types of files from Windows as well.

To summarize, if you’re using Type 1 outline fonts and \TeX then *DVIPSONE* is the printer driver of choice, independently of whether or not you’re also using *DVIWindo* as a previewer. It’s quite simply the most efficient, flexible, and sophisticated printer driver available for creating Postscript output from \TeX DVI files.

Since both *DVIWindo* and *DVIPSONE* are designed to be used with outline fonts, let me close this review as it began with a short consideration of an alternative to the standard Computer Modern fonts normally used for \TeX documents.

Fonts, Fonts, and More Fonts

Probably \TeX ’s biggest advantage over other typesetting software is its ability to set technical material, especially mathematics. This poses a real dilemma for users who want to make use of typefaces other than the \TeX default standard, Computer Modern. The problem is that the fonts used for text and those used for mathematical material have to “fit together” somehow in an aesthetically pleasing way.

Recognizing this fact, the designers of Computer Modern created two completely separate classes of complementary fonts—one for text, the other for math. Unfortunately (for T_EX users), until recently no other typeface was available in fonts that could serve this dual purpose. But the times they are a changin’.

In recent years publishers have become increasingly reluctant to use Computer Modern since this typeface has become almost a cliché in books typeset using T_EX. Moreover, many users have also become dissatisfied with the rather spindly-looking appearance of the Computer Modern font, longing for a decent alternative. Responding to this demand, the firm of Bigelow and Holmes undertook the task of designing an entirely new typeface for T_EX users. The end result is the Lucida family of Type 1 outline fonts, which consists of the two families Lucida Bright and Lucida New Math. Taken together, these families contain almost all the characters in all the commonly-used Computer Modern fonts, along with several new characters not available in the CM family.

The text fonts in the Lucida Bright family are now being used to set *Scientific American* magazine, so the reader may already be familiar with them without knowing it. To see the difference explicitly, here are two passages of text and mathematics done in Computer Modern and in Lucida. Here is the Computer Modern version:

This is a very short test, to make sure the program is working correctly. This paragraph starts flush left and shows the appearance of **bold face** type.

This paragraph is indented, and shows the appearance of *italics*. It contains the math formula $z^n = x^n + y^n$. Such a formula might also be displayed

$$z^n = x^n + y^n$$

to make it more prominent.

Now here’s the same passage in Lucida:

This is a very short test, to make sure the program is working correctly. This paragraph starts flush left, and shows the appearance of **bold face** type.

This paragraph is indented, and shows the appearance of *italics*. It contains the math formula $z^n = x^n + y^n$. Such a formula might also be displayed

$$z^n = x^n + y^n$$

to make it more prominent.

See the difference?

The Lucida passage is somewhat “heavier” than Computer Modern, which prevents it from looking so spidery on high-resolution phototypesetters. Moreover, the large x-height and low contrast between vertical and horizontal stems ensures that Lucida fonts also render well at low resolution. These fonts are also available in fully-hinted, Type 1 outline format from Y&Y, Inc.

There is a second alternative to Computer Modern as well. This is a version of the T_EX math fonts done in Times Roman by T_EXplorators, Inc., 1572 West Gray, #377, Houston, TX 77109-4948, 713-524-5515. The *MathTime* outline fonts from this firm offer Times Roman versions of the T_EX math italic, symbol, and math extension fonts that can be combined with the standard Adobe Type 1 Times Roman fonts that come “hardwired” into just about every Postscript printer. For the sake of comparison here is the test passage in Times Roman:

This is a very short test, to make sure the program is working correctly. This paragraph starts flush left, and shows the appearance of **bold face** type.

This paragraph is indented, and shows the appearance of *italics*. It contains the math formula $z^n + x^n = y^n$. Such a formula might also be displayed

$$z^n + x^n = y^n$$

to make it more prominent.

Again, the difference with Computer Modern is striking.

While a choice of typeface is a pretty subjective thing, the Times Roman version would definitely get my vote for typesetting a math book or a long paper. In fact I recently saw phototypesetter proofs of a topology book the T_EXplorator people are producing, which showed that at high resolution these fonts look every bit as good as the best mathematical typesetters anywhere in the world can produce.

But as always in life, there’s good news and bad. The good news about the *MathTime* fonts is that there is a very well-written, informative 42-page manual telling you how to install and use these fonts in T_EX documents. The bad news is that it takes a 42-page manual to give you all the necessary information. This could be more than a bit of a bother for many users, especially those not pretty familiar with the intricacies of T_EX computer installations. Let me add here, though, that Y&Y also offers a font utilities package containing *very* convenient batch files enabling users of *MathTime* fonts to convert them to forms suitable for use with these drivers. Believe me when I say that these utility programs take most of the pain out of using these fonts.

A good part of the difficulties in setting up and using the *MathTime* fonts can be attributed to the twin facts that the T_EXplorator fonts are not Adobe Type Manager compatible, which makes them awkward to use with some applications like Windows, and that unlike the Lucida Bright font set, they are not a *complete* replacement for Computer Modern. By this I mean that in order to have a complete and total set of Times Roman fonts to replace Computer Modern, you have to buy some special font sets from Adobe Systems, then put them together with the text fonts in your printer and the math fonts from T_EXplorators. So the overall installation is complicated and the expense nontrivial. But if it’s elegance and aesthetically pleasing results you’re after, it’s hard to beat the old reliable Times Roman typeface, and T_EXplorators have finally made it available to the mathematically-inclined T_EX user.

The Bottom Line

By way of summary it's useful to compare the two \TeX driver packages discussed here with another \TeX package using outline fonts. This is the program called *Vector \TeX* , which was reviewed in these pages a couple of years ago [1]. This package is the product of MicroPress, Inc., 68-30 Harrow Street, Forest Hills, NY 11375, 718-575-1816. On the one hand, *Vector \TeX* is a complete outline font implementation of \TeX , containing not only output drivers for screen and printer, but also a \TeX typesetting program. On the downside, however, is the fact that *Vector \TeX* uses a highly-nonstandard format for storing the outline fonts. As a result, users cannot employ the industry standard Adobe Type 1 fonts with *Vector \TeX* (although there is a utility program available so that TrueType fonts can be employed), nor can the *Vector \TeX* fonts be used in any other program. Just recently a Windows version of *Vector \TeX* was released together with a very useful combination manual and introduction to \TeX [2] written by the developer of *Vector \TeX* , Michael Vulis. For those readers wondering what *Vector \TeX* is all about let me add that this volume comes complete with a DOS diskette containing a fully-functional demonstration version of the program. Unfortunately, the due date for this review prevented an exploration of the capabilities and inadequacies of this Windows implementation, but preliminary indications suggest it will prove to be a worthy successor to its DOS-based cousin.

By way of contrast, *DVIWindo* and *DVIPSONE* are not implementations of \TeX at all (although complete \TeX packages containing *DVIWindo* and *DVIPSONE* are also available), but merely the "backends" needed to translate the \TeX formatter output into human-readable form. Thus they can be used with any \TeX installation that produces standard DVI files. Moreover, they are fully compatible with any Type 1 font that the user cares to employ in his or her document, giving access to the literally thousands of typefaces available from either the Adobe or the True Type typeface libraries. Of course this flexibility comes with the caveats noted above regarding the mixing of textual and mathematical material in one document. For this only the Lucida and Times Roman fonts offer a genuine alternative to Computer Modern. I might note also that there is now a Lucida alternative to Computer Modern available with the *Vector \TeX* implementation.

So what does it all add up to? Basically, the message is quite clear: If you have an existing bitmap-based implementation of \TeX and want to get into the 20th century, a call to Y&Y for a copy of *DVIWindo* and *DVIPSONE* or to MicroPress for a copy of *Vector \TeX* should be a high-priority item on your calendar. And mutatis mutandis for \TeX plorators, if your needs extend only to an alternative to the Computer Modern typeface. All three firms are to be congratulated on their efforts to bring \TeX one step closer to the desktop publication of high-quality, professional-looking mathematical documents.

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- [1] Casti, J., "V \TeX Typesetting Package," *Notices of the American Mathematical Society*, **38** (February 1991), No. 2, 105-109.
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MathType 3.0

Reviewed by David Hartz*

MathType 3.0 is an equation editor for the Macintosh that enables the user to create mathematical formulas in *MathType* and then paste the formulas into a word processor or other type of WYSIWYG document or to generate the \TeX code for the expression for pasting into a \TeX document. The producer of *MathType* 3.0, Design Science, 4028 Broadway, Long Beach, CA 90803, 800-827-0685, also has a version of *MathType* for Windows and has licensed Microsoft to package a simplified version of *MathType*, called *Equation Editor*, with Word 5.0. The Windows version of *MathType* was reviewed in this column in November 1992. I reviewed an earlier Macintosh version, *MathType* 2.11, in this column in April 1991. Since that time I have been a regular user of *MathType*, and I am very happy with it. I have found it to be very easy to learn and to use.

The new release, *MathType* 3.0, looks and feels very similar to its predecessor. The *MathType* window still contains a macro bar for storing commonly-used formulas and a wide variety of pop-up menus for mathematical symbols (over 150 including relational, logical, operator, and set theory symbols, arrows of all types and directions, and both the lower- and upper-case Greek alphabet) and pop-up menus for templates (over 100 for producing brackets of all types, radicals, fractions, integrals, sums and products, subscripts and superscripts, labeled arrows, and matrices). The only common mathematical expressions I have found that *MathType* was unable to produce easily were large vertical equal signs and labeled vertical or diagonal arrows. However, in the over two years I have used *MathType* I have never had the need to produce either of these, so this limitation has not affected me in the least.

The key feature of *MathType* is its automatic application of the standard rules for mathematical typesetting. That is, it recognizes the different parts of a mathematical expression and adjusts the format, size, and position of each accordingly. For example, if the ten characters "F(x)+ksinx" are typed in the *MathType* window, the result is "*F(x) + k sin x*". The variables *F*, *k*, and the two *x*'s are italicized, wide spaces are placed around the plus sign, and thin spaces are placed around the sin function. "Sin" is not italicized since it is recognized as a function included on a list of thirty-seven common function names built into the program. Any of the automatic formatting can easily be changed and text can be included in the formula. The automatic formatting works well and needs to be reformatted only infrequently.

The automatic formatting is performed via a variety of "styles". In general work in *MathType* is done in the "Math style", which is not actually a style but rather a style platform which assigns different styles to each part of the

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formula. In addition to the Math style, there are styles for text, functions, variables, lower- and upper-case Greek letters, symbols, vectors and matrices, and numbers. While working in the Math style, *MathType* recognizes each character or group of characters and assigns it to the proper style, so variables are put in the "variable style"; symbols such as parentheses, brackets, +, −, and = are assigned the "symbol style"; function names are assigned the "function style"; and so on. The Math style also assigns the proper spacing for the characters. The "text style" has no automatic formatting so text can be inserted. The attributes [font and italics or bold face] of each style can easily be changed as can the font sizes.

The previous discussion of *MathType* applies to *MathType* 3.0 as well as to the previous versions of *MathType*. The new features of *MathType* 3.0 are designed to take advantage of System 7 and to mesh smoothly with *Microsoft Word* 5. One of the most annoying aspects of using the previous version of *MathType* with *Word* was that when expressions were pasted into *Word*, the expression had to be subscripted (lowered) the indicated number of points to align with the text in *Word*. With *MathType* 3.0 and *Word* 5 this subscripting is no longer necessary, the expression is now automatically aligned with the rest of the text. Another nice new feature is that formulas created by *Word*'s formula language can now be pasted into *MathType* 3.0, and they are transformed into *MathType* expressions. I use this feature frequently. I find simple fractions, radicals, integrals, etc. are easy to type in *Word*'s formula language. Thus I can remain typing in *Word*, and when I stop for a break I copy the formulas to *MathType* and back to take advantage of the automatic formatting of *MathType* and to give a consistency of style to all the formulas in the document.

The other major change in *MathType* 3.0 is that it no longer runs as a Desk Accessory (D.A.). In System 7 an alias of *MathType* can be placed in the Apple menu to make it work like a D.A. If System 6 is used, then to use *MathType* 3.0 with another program you must use MultiFinder. The most exciting new feature of *MathType* 3.0 is how it works with *Word* 5 in System 7. Using Microsoft's OLE (Object Linking and Embedding), *MathType* 3.0 can be started within *Word* 5 by choosing "MathType Equation" from the Insert menu.

To edit an existing *MathType* expression you only need to double click on the expression to start up *MathType* 3.0. The expression will automatically appear in the *MathType* 3.0 window. When *MathType* is closed, the updated expression is placed back in the proper spot in *Word*.

I found no major problems with the program. The one problem I mentioned in my review of *MathType* 2.11, the difficulty of making major changes of font size of individual characters, has been fixed in this version. You can now enter the numeric value of the font size without having to go through all the intermediate sizes. I still wish it would be easier to add to the list of the thirty-seven recognized function names without having to use a resource editor. The strange grouping of the templates for products with the templates for unions and intersections still remains, instead of the more natural grouping of the product templates with the sum templates. The only minor problem I encountered with the new features of *MathType* 3.0 involved the ability to read *Word*'s formula language. For the last several years I have consistently used option hyphen for a minus sign, the regular hyphen is too short. When I do this in a formula in *Word* 5 and paste the formula into *MathType* 3.0, then *MathType* does not recognize the option hyphen and drops the character. So the minus sign is missing when I paste formula back into *Word*. I hope Design Science corrects this problem in the future.

MathType 3.0 is a fine addition to System 7, especially for users of *Microsoft Word* 5. The smooth integration of these programs allows mathematical formulas and equations to be easily included in a text in a manner which produces high-quality output and allows for easy editing of the equations. It will be even more useful when other programs adopt OLE as a standard protocol for linking applications. In fact *MathType* 3.0 is a strong argument in favor of adopting System 7. For those users who prefer to use System 6, *MathType* 3.0 has less to offer. If I were to remain with System 6 I think the loss of the ability to use *MathType* 3.0 as a D.A. would lead me to stick to the previous version of *MathType*. I have used *MathType* in the past and have found it to be a quality program that is easy to use. I am very happy with it and I intend to continue to use it.

Inside the AMS

New e-MATH Initiatives

The e-MATH service on the Internet is now into its third year of operation. Applications that provide professional information such as an on-line *Combined Membership List* and listings of professional opportunities are now well established. So are applications that support research, like the *Mathematical Reviews (MR)* author look-up and electronic distribution of the *Bulletin of the American Mathematical Society*.

A Committee on Electronic Products and Services (CEPS), formed in late 1992 and chaired by John Franks (Northwestern University), met at the San Antonio meeting in January 1993. This committee has now assumed oversight responsibility for the e-MATH system. For 1993, among other initiatives, commitments have been made to explore models for preprint services and an on-line version of *Current Mathematical Publications (CMP)*.

Preprint Service

e-MATH staff have been developing a model for disciplinary preprint services that is based on an integrated platform that uses FTP/GOPHER/WAIS/LISTSERV to support browsing and indexed searches. It is an outgrowth of an effort that has its roots in a meeting in May 1992, co-organized by the Association of Research Libraries (ARL) and the American Mathematical Society (AMS), in Washington, DC. Approximately twenty-five representatives from scholarly/learned societies, universities, libraries, and university presses met to

consider the feasibility of on-line, discipline-based, preprint repositories.

The AMS is moving forward at two levels:

- Access to existing preprint services: The e-MATH system will provide a common access point to existing efforts, both abstract and full-text initiatives. Where appropriate, owners will be lobbied to adopt GOPHER/WAIS as their core technology.
- Developing an AMS node: At the CEPS meeting in San Antonio several people expressed concern that preprints raise science policy issues (e.g., imprimatur, copyright) which may need review before proceeding.

On-Line CMP

Work is underway to evaluate the feasibility of offering an on-line version of *CMP*, the triweekly current-awareness journal produced by *MR*. Although *CMP* already exists in electronic format in the MathSci database (on CD-ROM or on-line through the DIALOG information service), there is interest in a direct AMS node for Internet access.

Accessing e-MATH

To access e-MATH:

telnet e-math.ams.org

Login and password are **e-math**. Internet connectivity is assumed, and VT100 terminal emulation is preferred. For more information send e-mail to support@e-math.ams.org.

News and Announcements

AMS Centennial Fellowships Awarded

The Society has awarded three Centennial Fellowships for 1993–1994. The recipients are JACQUES HURTUBISE of McGill University, ANDRE SCEDROV of the University of Pennsylvania, and DAVID WEBB of Dartmouth College.

Jacques Hurtubise

Jacques Hurtubise received his Ph.D. in 1982 from Oxford University under the direction of Nigel Hitchin. He taught at the Université du Québec à Montréal



Jacques Hurtubise

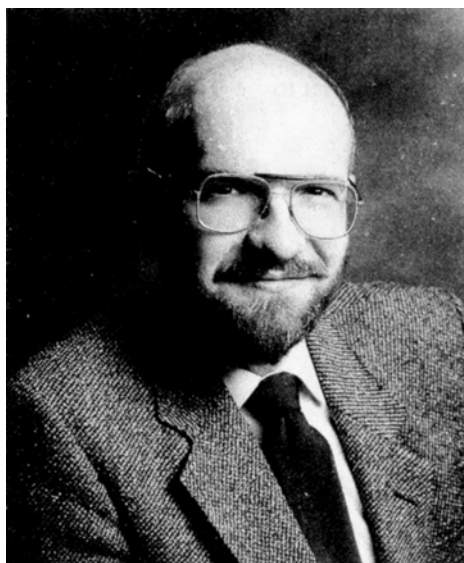
from 1982 to 1987, and then spent a year as a visitor at the Institute for Advanced Study in Princeton. Since 1988 he has been an associate professor at McGill University.

His research has focused on applications of algebraic geometry to gauge

theory and to the study of integrable systems. He considers himself most fortunate to have collaborated repeatedly with Malcolm Adams, Charles Boyer, John Harnad, Niky Kamran, Ben Mann, Jim Milgram, and Michael Murray.

Andre Scedrov

Andre Scedrov received his Ph.D. in 1981 from the State University of New York at Buffalo under the direction of John Myhill. In 1981 he became a T. H. Hildebrandt Research Assistant Professor at the University of Michigan, Ann Arbor. Since 1982 he has been at the University of Pennsylvania, with leaves during 1986 at the Ohio State University, and during 1989–1990 at Stanford University. He is currently a professor of mathematics and computer and information science at the University of Pennsylvania.

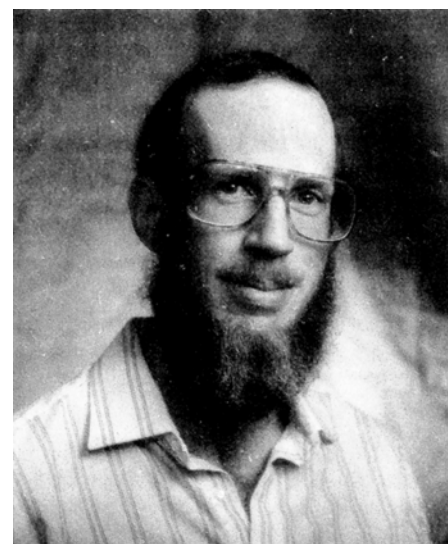


Andre Scedrov

Scedrov's research interests include mathematical logic and mathematical aspects of computer science, particularly the relationship between programs and formal proofs. Most recently he has focused on linear logic and on categorical semantics of programming languages.

David Webb

David Webb received his Ph.D. in 1983 from Cornell University under the direction of Ken Brown. After a year as a postdoctoral fellow at the University of Waterloo, he was a member of the



David Webb

faculty at Washington University in St. Louis, as an assistant professor from 1984–1990 and an associate professor after 1990. In 1992 he joined the faculty of Dartmouth College.

Webb's research interests include algebraic K -theory (particularly of group

rings) and differential geometry, especially questions concerning the spectrum of the Laplacian. He considers himself fortunate to have been exposed to the mathematical culture at Cornell and to have worked with a variety of intellectually stimulating collaborators.

Information about the competition for the 1994–1995 AMS Centennial Fellowships will be published in the Funding Information for the Mathematical Sciences section of the next issue of the *Notices*.

Siu Wins Bergman Prize

YUM-TONG SIU of Harvard University has been selected as the 1993 awardee of the Stefan Bergman Trust. The trust, established in 1988, recognizes mathematical accomplishments in the areas of research in which Stefan Bergman worked. The award consists of \$20,000 per year for two years.

In response to receiving the award, Professor Siu said, "I feel very honored to be chosen for the award in memory of Professor Stefan Bergman, whose fruitful ideas and pioneering work in the field of several complex variables have had such a great influence."



Yum-Tong Siu

Prize Citation

The following citation was provided by the Bergman Prize Selection Committee, which consisted of Joseph J.

Kohn (chair), Frederick W. Gehring, and Halsey L. Royden.

Professor Siu is generally recognized as one of the leading figures in complex analysis throughout the world. He has settled a long and impressive list of problems and opened new directions of research through highly imaginative and original use of sheaf theory, partial differential equations, and differential geometry. Here we will briefly mention a small selection of his research contributions.

During the first five years after his Ph.D. Siu worked on the problem of extending analytic sheaves across analytic sets in connection with the notion of q -convexity. In this research Siu solved a series of very hard problems culminating with his fundamental joint work with G. Trautman. In 1974 he proved a very deep result in complex analysis concerning the structure of positive closed currents, namely: the sets of density of such currents are analytic sets. Moreover he has given beautiful applications to the problem of extension of closed, positive currents and of meromorphic maps across subvarieties.

Since 1975 much of Siu's work has been connected with differential geometry. In collaboration with S.-T. Yau he proved several important results. Two striking examples are (1) simply-connected manifolds with "small" non-positive sectional curvature are isomorphic to \mathbb{C}^n , and (2) compact Kähler manifolds with positive curvature are isomorphic to \mathbb{P}^n (this settled the Frankel conjecture and was proved independently by Mori using methods of algebraic geometry). With G. D. Mostow he constructed an example of a compact manifold with negative sectional curvature that is not covered by the Euclidean ball.

Siu has pioneered the use of harmonic mappings in the study of complex manifolds. He has obtained, jointly with R. M. Range, important results concerning the $\bar{\partial}$ -equation. He has established the existence of Kähler-Einstein metrics on certain manifolds with positive anti-canonical line bundle. These are just a few of the highlights of his amazingly prolific and productive activity.

Biographical Sketch

Yum-Tong Siu was born on May 6, 1943 in Canton, China. He received his B.A. from the University of Hong Kong in 1963, his M.A. from the University of Minnesota in 1964, and his Ph.D. from Princeton University in 1966, where his thesis advisor was Professor Robert C. Gunning. He was an assistant professor at Purdue University (1966–1967) and the University of Notre Dame (1967–1970) before moving to Yale University, where he advanced to the rank of professor in 1972. He was a professor at Stanford University from 1978 to 1982 and has been a professor at Harvard University since 1982. He has held visiting positions at a number of institutions including the University of Paris VII, the University of Kaiserslautern, Kyoto University, Princeton University, Institut des Hautes Etudes Scientifiques, the University of Bayreuth, and the University of Nancy. He was a Sloan Fellow from 1971–1973 and a Guggenheim Fellow from 1985–1986. He received an honorary doctorate from the University of Hong Kong in 1990 and was elected a corresponding member of the Göttingen Academy of Sciences in 1993. Over the years he has presented invited addresses in many conferences, including the International Congress of Mathematicians in Helsinki in 1978 and in Warsaw in 1983.

About the Prize

The Bergman Prize honors the memory of Stefan Bergman, best known for his research in several complex variables, as well as the Bergman projection and the Bergman kernel function which bear his name. A native of Poland, he taught at Stanford University for many years and died in 1977 at the age of seventy-eight. He was an AMS member for thirty-five years. When his wife died, the terms of her will stipulated that funds should go toward a special prize in her husband's honor.

The AMS was asked by Wells Fargo Bank of California, the managers of the Bergman Trust, to assemble a committee to select recipients of the prize. In addition the Society assisted Wells Fargo in interpreting the terms of the will to assure sufficient breadth in the mathe-

mathematical areas in which the prize may be given. Awards are made every two years in the following areas: (1) The theory of the kernel function and its applications in real and complex analysis; and (2) Function-theoretic methods in the theory of partial differential equations of elliptic type with attention to Bergman's operator method.

Balaguer Prize Awarded for 1992

The Institut d'Estudis Catalans has awarded the first Ferran Sunyer i Balaguer Prize to ALEXANDER LUBOTZKY of the Hebrew University of Jerusalem for his monograph entitled *Discrete Groups, Expanding Graphs, and Invariant Measures*. The prize consists of 12,000 ECU. The monograph will be published in Birkhäuser-Verlag's series "Progress in Mathematics".

Each year, the Ferran Sunyer i Balaguer Prize will be awarded for a mathematical monograph of an expository nature presenting the latest developments in an active area of research in mathematics in which the applicant has made important contributions. The prize honors the memory of Ferran Sunyer i Balaguer (1912–1967), a self-taught Catalan mathematician who, in spite of a serious physical disability, was very active in research in classical analysis and achieved international recognition.

The prizewinner was chosen by a committee consisting of Gerhard Frey, Universität Essen; Joan Girbau, Universitat Autònoma de Barcelona; Paul Malliavin, Université de Paris VI; Joseph Oesterle, Université de Paris VI; and Alan Weinstein, University of California at Berkeley.

ILAS Prizes in Linear Algebra

The International Linear Algebra Society (ILAS) has announced that the first Hans Schneider Prize in Linear Algebra has been awarded jointly to MIROSLAV FIEDLER of the Czech Academy of Sciences, SHMUEL FRIEDLAND of the University of Illinois at Chicago, and ISRAEL GOHBERG of Tel-Aviv University.

Awarded every three years, the Hans Schneider Prize recognizes research, contributions, and achievements at the highest level of linear algebra. The prize may be awarded for an outstanding sci-

entific achievement or for lifetime contributions. The prize is awarded by the ILAS Executive Board on recommendation of a prize committee, which for the present awards consisted of Tom Laffey (chair), Gene Golub, Alan Hoffman, Hans Schneider (*ex officio*), and Robert Thompson.

Miroslav Fiedler was recognized for a range of contributions in linear algebra. With early results in the theory of simplices, Fiedler went on to make fundamental contributions to algebraic graph theory and to the combinatorial study of simplices. He investigated the influence of the diagonal entries of a matrix on its spectrum and, as the prize citation says, provided "a foretaste of major contributions to the problem of localization of the spectrum of general matrices—that is, determining the smallest complex domain containing all the eigenvalues". The citation goes on to note that his work in the theory of M -matrices influenced the direction of research in the field, "and the Laplacian matrix continues to provide surprises". In addition Fiedler has made significant contributions to mathematical economics and numerical linear algebra.

Shmuel Friedland has made fundamental contributions in analysis, algebra, and geometry. "A number of the deepest and most elegant results in linear algebra are due to him," the citation notes, "and he has enriched the subject through the introduction of powerful analytic and algebraic tools." Among his most striking results are a proof that, given a complex matrix, one can find a diagonal matrix such that the sum of the two matrices has a given complex spectrum; an effective solution to the simultaneous (linear) similarity problem for matrices; a best possible bounds for the permanent and related functions on certain classes of matrices; and a generalization of a theorem of Motzkin and Taussky. He has also made significant contributions to combinatorial matrix theory and has developed a powerful method of attack on the graph isomorphism problem.

Israel Gohberg was recognized for contributions which cover most aspects of linear algebra and which are represented by more than 300 publications.

His work with M. G. Krein has had a profound impact on functional analysis and linear algebra. His book with Bart and Kaashoek, *Minimal Factorizations of Matrices and Operator Functions*, "is the seminal work in the subject and has led to great advances in the area," the citation says. "The classification of pencils of matrices under equivalence achieved by Kronecker in the last century is still difficult today and the problem of extending it to general matrix polynomials is daunting," the citation says. "Gohberg and his collaborators have made tremendous progress in this." Gohberg's results extend through a wide range of areas, such as spectral theory, canonical forms, perturbation theory, complexity, and systems theory. The citation concludes by noting, "Because of the strength and interest of his results, he has greatly influenced the direction of the development of linear algebra."

The prizes were awarded at the ILAS meeting, Pure and Applied Linear Algebra: The New Generation, held in March 1993 at the University of West Florida. Fiedler delivered his prize address at that meeting. Gohberg will deliver his prize address at the ILAS meeting in Rotterdam in August 1994, and Friedland will deliver his at the ILAS meeting in Atlanta in August 1995.

The prize is made possible by a donation by Hans Schneider, James Joseph Sylvester Professor of Mathematics at the University of Wisconsin at Madison. Well known for his contributions to linear algebra, Schneider is the first president of ILAS.

Graduate Student Fulbrights Awarded for 1992–1993

The J. William Fulbright Foreign Scholarship Board and the United States Information Agency have made Fulbright awards to graduate students to study abroad in 1992–1993. There were three awards in mathematics. PAUL B. JOHNSON of Wesleyan University to go to the Czech Republic and Slovakia; STEVEN LIEDAHL of the University of California at Los Angeles to go to Israel; and KEVIN O'BRYAN of the Rose-Hulman Institute of Technology to go to Hungary.

National Academy of Engineering Election

In February 1993, the National Academy of Engineering announced the election of seventy-three new members and eight foreign associates. Among these was CARL R. DE BOOR, professor of mathematics and computer science at the University of Wisconsin, Madison, who was elected for "contributions to numerical analysis and methods, in particular numerical tools used in computer-aided design."

Naomi Fisher Receives Hay Award

NAOMI FISHER of the University of Illinois at Chicago has received the Louise Hay Award for Contributions to Mathematics Education. Established by the Association for Women in Mathematics (AWM) in 1990, the annual Hay Award highlights the importance of mathematics education by honoring distinguished contributions to education by a woman mathematician. The award was presented during the AWM business meeting at the Joint Mathematics Meetings in San Antonio in January 1993.

Fisher serves as co-director of the Mathematicians and Education Reform (MER) Network, which was created to facilitate the involvement of mathematicians in educational reform efforts. Over the past four years, over 300 mathematicians and mathematics educators have participated in regional MER workshops. In addition MER has produced two volumes of collected articles published in the Conference Board of the Mathematical Sciences series "Issues in Mathematics Education". "Much of the success of MER can be directly attributed to the vision and efforts of Dr. Fisher," says the citation for the award. "From the beginning, she had a clear sense of what was needed to develop a feeling of respectability for education-related projects among research mathematicians."

Fisher is also the director of the High School Teaching Program for the Regional Geometry Institute held each summer in Park City, Utah. "Dr. Fisher developed a rigorous and exciting agenda for teachers that has been widely praised by participants," the citation says. "She

also structured the program so that there would be significant time for exchange of ideas between the researchers [participating in the Institute] and the high school teachers."

Before coming to the University of Illinois at Chicago, Fisher served four years as associate director of the University of Chicago School Mathematics Project. "There she had the difficult task of articulating the work and ideas of many different contributors into a coherent program," the citation states. "The wide commercial success of the University of Chicago materials can at least in part be attributed to Dr. Fisher's success in accomplishing that task and in laying a strong foundation for further development and growth." In addition her ideas helped inspire many of the geometry lessons being developed in that program, as well as in the Teaching Innovative Mathematics and Science Program.

"Dr. Fisher has helped people stretch their thinking about mathematics," the citation concludes. "In doing so, she has embodied a spirit and passion for mathematics that was shared by Louise Hay."

The Hay Award honors the memory of Louise Hay, who was widely known for her contributions to mathematical logic and her strong leadership as head of the Department of Mathematics, Statistics, and Computer Science of the University of Illinois at Chicago, a position she held at the time of her death in 1989. The resolution establishing the prize says, "Her devotion to students and her lifelong commitment to nurturing the talent of young women and men secure her reputation as the consummate educator."

Hyman Bass New Chair of MSEB

Hyman Bass of Columbia University has been appointed chair of the Mathematical Sciences Education Board (MSEB) of the National Research Council. He succeeds Alvin W. Trivelpiece, director of Oak Ridge National Laboratories. Bass, who has been on the board for the past two years, will serve a three-year term as chair beginning July 1, 1993.

Well known for such reports as "Everybody Counts" and "On the Shoulders

of Giants", the MSEB works at the national level to improve mathematical education for students at all levels, from grade school through graduate school.

AAAS Awards for Mentoring and Journalism

The American Association for the Advancement of Science (AAAS) made a number of awards at its annual meeting in Boston in February 1993. One of the awards, the AAAS Mentor Award, went to ABDULALIM ABDULLAH SHABAZZ, chair of the mathematics department at Clark Atlanta University. In addition one of the AAAS-Westinghouse Awards for Science Journalism was presented to RICHARD PRESTON for an article about two mathematicians, David and Gregory Chudnovsky.

The Mentor Award consists of \$5000 and a plaque. Professor Shabazz was honored "for extraordinary efforts throughout his career to mentor generations of minority students, Ph.D. mathematicians and mathematics educators, and enhance the careers of hundreds of minority mathematicians". In 1957, when Professor Shabazz began teaching at what was then Atlanta University, only two students were pursuing master's degrees in mathematics. Over the next six years he recruited and assisted 109 students toward obtaining their master's degrees in mathematics. Thirty of these students went on to earn doctoral degrees in mathematics or mathematics education. Since that time he has continued to encourage and assist hundreds of students in their academic choices and career development.

Professor Shabazz received his bachelor's degree from Lincoln University in 1949, his master's degree from the Massachusetts Institute of Technology in 1951, and his Ph.D. in mathematics from Cornell University in 1955. He has just completed research for his book, *Mathematics at Dawn*, which will describe the role and contributions of the people of Africa and Asia in the development and origin of the mathematical sciences.

There were six AAAS-Westinghouse Science Journalism Awards, each consisting of \$2500 and a plaque. RICHARD PRESTON was honored for his article

"The Mountains of Pi", published in the March 2, 1992 issue of *The New Yorker*. The article profiles the Chudnovsky brothers, David and Gregory, who have installed a supercomputer in their New York City apartment in order to explore the number π . Preston, freelance writer, received a Ph.D. in English from Princeton University. His book *First Light*, about the 200-inch Hale telescope at the Palomar Observatory, won the 1988 American Institute of Physics Science Writing Award and is now being developed into a PBS documentary. Preston is currently at work on a book about emerging viruses.

Mathematics Projects Garner Awards

in Westinghouse Competition

High school students submitting mathematics projects garnered four out of the top ten prizes in the Westinghouse Science Talent Search, one of the nation's most prestigious competitions for young people interested in science and mathematics. The competition awarded a total of \$205,000 in scholarships.

LENHARD LEE NG of Chapel Hill, North Carolina won the third-place prize of a \$20,000 scholarship. His project studied how well a shopper can approximate the total cost of a number of groceries by rounding each item's price to the nearest dollar and adding together the rounded prices. His analysis used the probability of getting the actual cost to the nearest dollar and the expected error, both of which depend on the number of items purchased.

WEI-HWA HUANG of North Potomac, Maryland won the sixth-place prize of a \$15,000 scholarship for a project that analyzed mathematically the puzzle game Peg Solitaire. MAHESH KALYANA MAHANTHAPPA of Boulder, Colorado was the seventh-place winner of a \$10,000 scholarship for a new method of finding integer solutions of the general exponential diophantine equation, $x^m + D = g^n$. STEVE SHAW-TANG CHIEN of Potomac, Maryland received the eighth-place prize of a \$10,000 scholarship for devising a winning strategy for all higher-dimensional forms of Wythoff's Game. ELIZABETH DEXTER MANN of Silver Spring, Maryland won the ninth-

place prize of a \$10,000 scholarship for developing an algorithm to implement the wavelet transform on a massively parallel computer. The three students from Maryland all attend Montgomery Blair High School in Silver Spring, Maryland.

First- and second-place went to students submitting biology projects: Elizabeth Michele Pine of Chicago, Illinois received a \$40,000 scholarship, and Xanthi M. Merlo of Racine, Wisconsin received a \$30,000 scholarship.

The prizes were presented at an awards banquet in Washington, DC on March 8, 1993. In addition to the top ten prizes, first and second alternates and twenty-eight other finalists received \$1000 scholarships. The winners were selected by a panel of eight prominent scientists after interviews designed to evaluate the students' scientific creativity and potential. This is the fifty-second Science Talent Search. Finalists in previous competitions have gone on to become Fields Medalists, Nobel Laureates, MacArthur Foundation Fellows, and members of the National Academy of Sciences and the National Academy of Engineering.

AWM Moves to Maryland

The Association for Women in Mathematics (AWM) has moved from its twenty-year home on the Wellesley College campus to the University of Maryland at College Park. The new executive director is Virginia S. Reinhart. The address is: Association for Women in Mathematics, 4114 Computer and Space Sciences Building, University of Maryland, College Park, MD 20742; telephone 301-405-7892; e-mail: awm@math.umd.edu.

News from the Mathematical Sciences Institute Cornell University, the University of Puerto Rico, and SUNY Stony Brook

With support from the Army Research Office and the National Science Foundation, Bakhadyr Khoushainov, a visitor at the Mathematical Sciences Institute (MSI), has assembled a list of over 250 logicians in the former Soviet Union. The list includes current ad-

resses and electronic mail addresses, when available. For a copy of the list, send a message to Khoushainov at bakh@msiadmin.cit.cornell.edu or write to MSI, Cornell University, 409 College Ave., Ithaca, NY 14886.

MSI's R. Durrett and M. Sweedler will speak at the Eleventh Army Conference on Applied Mathematics and Computing to meet at Carnegie Mellon University June 8-11, 1993. For information contact the U.S. Army Research Office, Box 12211, RTP, NC 27709.

R. Durrett, Director of the MSI Center for Stochastic Analysis, will co-chair the AMS's 41st Summer Research Institute to meet at Cornell University July 11-30, 1993. Stochastic Analysis is the topic. Contact R. Durrett at rtd@cornell.cit.cornell.edu for more information.

MSI Director A. Nerode and W. Marek from the University of Kentucky are co-general chairs for the 1994 International Symposium on Logic Programming to meet in Ithaca in November 1994. For information contact W. Marek at marek@ms.uky.edu.

For information on other MSI conferences see the March 1993 *Notices*, pp. 244-245.

For general information concerning the Mathematical Sciences Institute and conferences at MSI's Ithaca headquarters, please contact Diana Drake at deede@msiadmin.cit.cornell.edu.

News from the Mathematical Sciences Research Institute Berkeley, California

During 1994-1995 the Mathematical Sciences Research Institute (MSRI) will feature a full-year program on Automorphic Forms, and a half-year program in the spring on Complex Dynamics and Hyperbolic Geometry. More details on these programs and how to apply if you wish to participate may be found in the advertisements at the back of this issue of the *Notices* (pp. 550 and 551). Also information on these and other activities at MSRI can be obtained by writing MSRI at 1000 Centennial Drive, Berkeley, CA 94720, or by sending e-mail to info@msri.org with the message consisting of the single word, "help", or

by anonymous ftp from chern.msri.org (128.3.188.52).

The program in Differential Geometry during the coming year will be divided into a number of sub-programs and themes. Some of the themes will be pursued during the entire year, and others for shorter periods, but each will have a period of concentration, and in some cases, an associated workshop. The schedule is as follows:

September 1993

Differential Equations Related to Curvature Problems (Organizer: R. Schoen).

This includes scalar and Ricci curvature. It covers both elliptic and evolution equations, and it includes Einstein manifolds and their moduli, the Ricci flow, the mean curvature flow, and questions related to the Yamabe problem. Workshop, September 22–24, 1993.

October 1993

A. *Spaces of Negative Curvature* (Organizer: W. Ballman).

This will feature a week of concentrated activity from October 3–10, 1993.

B. *Comparison Geometry: Spaces of Positive Curvature, Gromov-Hausdorff Convergence, Alexandrov Spaces, etc.* (Organizer: K. Grove). Workshop, October 25–27, 1993.

November 1993

Spectral geometry (Organizer: C. Gordon). Workshop, November 8–10, 1993.

January 1994

Geometry and Mathematical Physics (Organizer: R. Bott).

This will be a month long series of lectures by mathematicians and physicists. E. Witten and E. Getzler have agreed to participate.

March 1994

Exterior Differential Systems, Submanifolds, and Control Theory (Organizers:

R. Bryant & S. S. Chern). Workshop, March 2–4, 1994.

April 1994

Harmonic Maps, Minimal Submanifolds, and Rigidity Questions (Organizer: R. Schoen). Workshop, April 20–22, 1994.

Spring 1994

A Program on Special Geometric Structures, Reduced Holonomy, and Low-Dimensional Geometry (Organizer: R. Bryant).

Fall and Spring 1993–1994

There will be a year-long concentration on submanifold theory run by S.S. Chern.

A related workshop on Elliptic and Parabolic Methods in Geometry will be held May 23–27 at the Geometry Center in Minneapolis. The organizers are B. Chow, R. Gulliver, and J. Sullivan. For further information send e-mail to epmg@geom.umn.edu.

Another related event, prior to the beginning of the program, is the Workshop on Riemannian Geometry at the Fields Institute in Waterloo, August 3–13, 1993. For e-mail information use lovric@fields.uwaterloo.ca.

More details on the individual workshops will appear in subsequent issues of the *Notices* and on widely distributed posters.

**News from the
Center for Nonlinear Analysis
Carnegie Mellon/
Hampton Universities**

The Center for Nonlinear Analysis announces the following postdoctoral appointments for the 1993–1994 year: G. Friesecke (1993 Ph.D., Heriot-Watt University), J. Lu (1993 Ph.D., Courant Institute), D. Polignone (1993 Ph.D.,

University of Virginia), B. Stoth (1992 Ph.D., Bonn University), and A. DeSimone (1992 Ph.D., University of Minnesota). DeSimone, who is presently at the University of Rome, is taking a post-doctoral position jointly funded by the Center and the Italian research agency Consiglio Nazionale della Ricerche.

The Center is hosting the Eleventh Army Conference on Applied Mathematics and Computing in Pittsburgh, June 8–11, 1993. Invited Speakers are R. Durrett (Cornell University), P.S. Krishnaprasad (University of Maryland), R. Nicolaides (Carnegie Mellon University), J. Tsitsikles (MIT), and D. Yuen (MIT). Special sessions are planned in stochastic analysis, computation in environmental geoscience, virtual factories, and viscosity solutions.

A workshop on "Approximation and Numerical Methods Related to Diffusion Processes" will be held October 9–12, 1993, at Carnegie Mellon. The organizers are T. Kurtz, E. Pardoux, and S. Shreve.

For more information about the activities of the Center for Nonlinear Analysis contact the Center at the Department of Mathematics, Carnegie Mellon University, Pittsburgh, PA 15213-3890; fax: 412-268-6380; cn0s@andrew.cmu.edu.

NSF Advisory Committee Meeting

The Advisory Committee for the Mathematical Sciences of the National Science Foundation (NSF) will hold its next meeting May 14–15, 1993, at NSF headquarters in Washington, DC. The committee provides advice to the NSF's Division of Mathematical Sciences (DMS) about support for mathematics.

The meeting is open to the public. For more information call the DMS at 202-357-9669 or send electronic mail to Trudy Sensibaugh, tsensiba@nsf.gov (Internet) or tsensiba@nsf (Bitnet).

Funding Information for the Mathematical Sciences

Target Dates Instituted at NSF

The Division of Mathematical Sciences of the National Science Foundation (NSF) has established target dates for the submission of proposals to the grants program. On February 16, 1993, Division Director Frederic Y. M. Wan issued the following announcement.

Dear Colleague:

Announcement of Proposal Target Dates. In order to improve the Division's proposal management, and possibly to employ disciplinary panels in the merit review of proposals, the Division of Mathematical Sciences plans to introduce target dates for proposal submission for disciplinary research activities for [fiscal year] 1994 NSF funds.

Beginning in the fall of 1993 the Division will introduce two target dates for proposals submitted to the following programs:

October 22, 1993

- Algebra and Number Theory Program
- Classical Analysis Program
- Modern Analysis Program
- Topology and Foundations Program

November 19, 1993

- Applied Mathematics Program
- Computational Mathematics Program
- Geometric Analysis Program
- Statistics and Probability Program.

These dates do not overlap substan-

tially with other known NSF target dates, mesh reasonably well with academic calendars, and cluster the programs so as to provide a balance with respect to both overlapping scientific content and anticipated program proposal loads.

Proposals that miss the target dates will be handled as time permits. Priority will be given to proposals arriving on or before the above target dates.

The above dates do not apply to the activities of the Division's Office of Special Projects. These activities already have specified target or deadline dates.

Sincerely,

Frederic Y. M. Wan
Division Director

Division of Mathematical Sciences

TRANSLATIONS OF MATHEMATICAL MONOGRAPHS

Algebraic Functions

Kenkichi Iwasawa

Volume 118

This is a translation of Iwasawa's 1973 book, *Theory of Algebraic Functions*, originally published in Japanese. Because the book treats mainly the classical part of the theory of algebraic functions, emphasizing analytic methods, it provides an excellent introduction to the subject from the classical viewpoint. Directed at graduate students, the book requires some basic knowledge of algebra, topology, and functions of a complex variable.

1991 *Mathematics Subject Classification*: 14, 30; 33

ISBN 0-8218-4595-0, 287 pages (hardcover), April 1993

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For Your Information

This year the Societal Institute of the Mathematical Sciences (SIMS) will celebrate its twentieth anniversary. SIMS concentrates on applications of the mathematical sciences to important problems facing society, such as environmental problems, energy conservation, and AIDS. The following piece is based on a press release sent out by SIMS. For more information about SIMS, write to: SIMS, 97 Parish Road South, New Canaan, CT 06840; telephone 203-966-1008; fax 203-972-6069.

20th Anniversary of the Societal Institute of the Mathematical Sciences

SIMS was conceived as an outcome of an ad hoc committee organized by the Society for Industrial and Applied Mathematics (SIAM) to explore mathematics and problems of society. A special conference was held over a rainy weekend at Columbia University's Arden House in June 1972. Experts were invited from certain applied fields, such as population growth, environmental pollution, public health, arms control, etc. These experts were asked to review problem areas where it was thought an increased use of mathematics might be encouraged and might prove useful. Subsequently it was decided that SIMS should be brought into existence to (1) facilitate research on societal problems, (2) hold conferences, and (3) obtain funds to support other appropriate endeavors.

Throughout the course of the summer and fall of 1972 plans for the SIAM Institute for Mathematics and Society (SIMS) were developed. The Institute was formally incorporated in the Commonwealth of Pennsylvania and came into existence in January 1973 with its own officers and Board of Directors; directors were elected by the SIAM Board of Trustees. In 1987 the Institute became the Societal Institute of the Mathematical Sciences, keeping the same acronym SIMS, but becoming independent of SIAM. Its substantive scientific efforts have thrived and have been recognized throughout North America and Europe. In January 1993 SIMS became twenty years old.

Many people have contributed to SIMS projects in different ways. One consequence is that many Ph.D. graduates

have embarked on careers concerned with societal issues and mathematics.

In its early years SIMS conducted a "Transplant Program" in which mathematicians were "transplanted" to an interdisciplinary center concerned with societal issues (e.g., environmental medicine, urban crime, energy, population growth, and cultural evolution). A "transplant" usually stayed for two years; a senior mathematician was asked to keep close to the transplant so that he or she did not feel lost and forgotten. SIMS's most successful transplant has worked impressively in environmental medicine, particularly in cancer research, and recently appeared on CBS on national television.

The transplant program grew so that eventually whole groups of mathematical/statistical researchers were transplanted rather than individuals. The first group resulted from an early SIMS conference in Alta, Utah on epidemiology at which one well-known participant exhorted SIMS by saying, "You must do something about pollution and health."

Shortly thereafter SIMS organized statistical groups in studies at Stanford University: one in monitoring air pollution and investigating its causes and one in environmental cancer. Subsequently, more groups were organized at the Harvard School of Public Health, Columbia University, the (San Francisco) Bay Area Air Quality Management District, the University of Washington (Seattle), the University of British Columbia, the Rand Corporation (Santa Monica, CA), and the New York City Rand Institute. The groups at Stanford are still functioning in the same research study after almost seventeen years. One Stanford group is now working together with the Rand Corporation and the University of California at Berkeley (School of Public Health) on a four-year study of human exposure problems.

In 1987 SIMS organized a four-year study on statistical methodology for the study of the AIDS epidemic, with particular attention to the dynamics of the disease in intravenous drug users. This study now is in the second year of its second four-year term. It has become an international effort with groups at the University of California (Berkeley and San Francisco), New York University Medical Center, the University of Waterloo (Ontario, Canada), and the University of Tübingen (Germany).

The principal products of all these research studies have been some 300 technical reports, many of which have been

published in scientific journals and have had an impact in the societal field.

SIMS has also conducted over a dozen research application conferences on societal issues such as ecosystems, energy, environmental pollution, and AIDS and other health topics. Each of these conferences lasted five days and usually had thirty-five to forty attendees, of which fifteen to twenty were invited speakers. Each conference has resulted in proceedings which were published as soon as possible so that topics presented and discussed could be made available quickly to all researchers in the field. These proceedings have been published by SIAM, Wiley & Sons, and Birkhäuser Boston. These conferences have been held in Alta, Utah and Berkeley, California. The next one is on AIDS and is scheduled to be held following the IXth AIDS Conference in Berlin in a conference center belonging to the University of Tübingen; the center is located in Blaubeuren, Germany, near Ulm.

SIMS conducted two three-week Tutorials on Genomic Analysis, one at Stanford University in 1991 and one at Rutgers University (DIMACS) in 1992. Participants were graduate students and postdoctorals, and instructors were

experts in the field. Their presentations were made over periods lasting one to five days. A tutorial volume is planned by Birkhäuser.

Financial support for SIMS programs has come from both private organizations and government agencies. The principal private sources have been the Sloan Foundation, The Research Corporation, Exxon, IBM, the Rockefeller Foundation, and SIAM; the principal government agencies have been the Environmental Protection Agency, the Department of Energy, the Office of Naval Research, the National Science Foundation, the National Institute on Drug Abuse of the National Institutes of Health, and the National Center for Human Genome Research. Strong support continues for SIMS efforts.

To celebrate SIMS's twentieth anniversary, special sessions at national meetings are being planned during 1993 and early 1994. Much of SIMS's current efforts are being carried out in the San Francisco Bay Area. The next national meetings of the American Statistical Association and the American Association for the Advancement of Science are being held in San Francisco; special SIMS sessions are being planned at both.

PROCEEDINGS OF SYMPOSIA IN PURE MATHEMATICS

Differential Geometry

Robert E. Greene and S. T. Yau, Editors

Volume 54

These three parts contain the proceedings of the AMS Summer Institute on Differential Geometry, held at the University of California, Los Angeles, in July 1990. This was the largest AMS Summer Institute ever, reflecting the wide-ranging and intense research activity in the subject. The parts contain many extensive survey articles presenting perspectives on relatively broad topics; these articles would be accessible to advanced graduate students. In addition, the authors of the research articles were encouraged to survey the relevant literature. The three parts together offer the deepest and most comprehensive survey of recent research in differential geometry available today.

1991 *Mathematics Subject Classification*: 32, 53, 58, 81, 83

ISBN (Set) 0-8218-1493-1; ISBN (Part 1) 0-8218-1494-X; ISBN (Part 2) 0-8218-1495-8; ISBN (Part 3) 0-8218-1496-6

560 pages (Part 1); 655 pages (Part 2); 710 pages (Part 3) (hardcover), March 1993

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Northern Illinois University, DeKalb, Illinois

May 20–23, 1993

Program

The eight hundred and eighty-second meeting of the American Mathematical Society (AMS) will be held at Northern Illinois University, DeKalb, Illinois, from Thursday, May 20, through Sunday, May 23, 1993. Special sessions and sessions for contributed papers will be held in DuSable Hall and Cole Hall, and invited addresses will be in the auditoria in Cole Hall.

Invited Addresses

By invitation of the Central Section Program Committee, there will be three invited addresses. The speakers, their affiliations, and the titles of their talks are:

Susan J. Friedlander, University of Illinois at Chicago, *Instabilities in fluid motion*.

Russell D. Lyons, Indiana University, *Trees, Housdorff dimension, and probability*.

Clark Robinson, Northwestern University, *Chaos in dynamical systems*.

Special Sessions

By invitation of the same committee there will be eleven special sessions of selected twenty-minute papers. The topics of these sessions and the names and affiliations of the organizers are as follows:

Advances in linear algebra: theory, computation, application, **Gregory S. Ammar**, Northern Illinois University.

Number theory, **Michael A. Filaseta**, University of South Carolina, and **Carl Pomerance**, University of Georgia.

Mathematical topics in fluid dynamics, **Susan J. Friedlander**.

Combinatorics, **Zoltan Furedi**, University of Illinois, Urbana.

Analytic number theory, **Andrew J. Granville**, Isaac Newton Institute for the Mathematical Sciences.

Beautiful graph theory, **Frank Harary**, New Mexico State University.

Stochastic processes, **Mohsen Pourahmadi**, Northern Illinois University.

History of mathematics, **Jeanne LaDuke**, DePaul University.

Function theory, **Linda R. Sons**, Northern Illinois University.

Probabilistic methods, **Joel H. Spencer**, New York University, Courant Institute of Mathematical Sciences.

Discrete groups, **Peter Waterman**, Northern Illinois University.

Abstracts for consideration for these sessions should have been submitted by the **February 3, 1993**, deadline. This deadline was previously published in the Invited Speakers and Special Sessions section of the *Notices*.

The sessions on *Function theory*, *Number theory*, *Combinatorics*, *Analytic number theory*, *Beautiful graph theory*, and *Probabilistic methods* have been coordinated to coincide with the Paul Erdős Birthday Celebration being organized by Northern Illinois University.

Contributed Papers

There will also be sessions for contributed ten-minute papers. Abstracts should have been submitted by the **February 26, 1993**, deadline previously published in the Calendar of AMS Meetings and Conferences. Late papers will not be accommodated.

Registration

The meeting registration desk will be located in the third floor west corner foyer of DuSable Hall and will be open from 8:00 a.m. until 5:00 p.m. on Thursday, May 20; Friday, May 21; Saturday, May 22; and from 8:00 a.m. until noon on Sunday, May 23. The registration fees are \$30 for members of the AMS; \$45 for nonmembers; and \$10 for emeritus members, students, or unemployed mathematicians, payable by cash, check, or Visa or MasterCard.

Events of Other Organizations

Northern Illinois University is celebrating the birthday of Paul Erdős in conjunction with the meeting. They have arranged for a one-hour mathematical address by Paul Erdős and for a banquet in his honor (see next page). The Erdős lecture will be at 4:15 p.m., Thursday, May 20, in Room 100 of Cole Hall. As noted above, a number of the Special Sessions at this meeting are coordinated with the Erdős Birthday Celebration. For further information contact John Selfridge of Northern Illinois University.

Social Event

A banquet honoring Paul Erdős is planned for Thursday, May 20. A cash bar reception from 6:30 p.m. to 7:30 p.m. will be followed by dinner at 7:30 p.m. The buffet dinner includes choice of salads, hand-carved roast baron of beef, baked chicken, mixed vegetables, rice, rolls with butter, apple pie, and beverage. Tickets including tax and gratuity are \$25 for each mathematician and \$20 for each of their guests. **Tickets must be ordered by May 6, 1993.** Mail orders, including your name, affiliation, and a check

Meetings

payable to Northern Illinois University, should be sent to Math Conference Banquet, College of Continuing Education, Northern Illinois University, DeKalb, IL 60115. Credit card orders can be charged to Visa, MasterCard, or Discover by calling 815-753-0277.

Accommodations

A block of sixty-three rooms has been reserved in the **Holmes Student Center Guest Rooms**. This air-conditioned facility is located on campus and is a five-minute walk to DuSable Hall. The rate for a single room is \$37.74 per night. The rate for a double room is \$43.29 per night. The rate for a triple room is \$48.84 per night. All rates include tax. To make a reservation call 815-753-1444 (FAX 815-753-5099). Participants must indicate they are attending the AMS meeting.

Although rooms have not been blocked at the following locations, information is included for your convenience. Rates are subject to change and include tax. Participants should make their own arrangements with the hotel of their choice and ask for the AMS conference rate. **The AMS is not responsible for rate changes or the quality of the accommodations offered by these hotels/motels.**

Days Inn in DeKalb (15-minute walk to DuSable Hall)

1212 W. Lincoln Highway, DeKalb, IL 60115
Telephone: 815-758-8661
Single or Double \$49.95

Ho Jo Inn (15-minute walk to DuSable Hall)

1321 W. Lincoln Highway, DeKalb, IL 60115
Telephone: 815-756-7620
Single \$38.85 Double \$43.29

Motel 6 (15-minute walk to DuSable Hall)

1116 W. Lincoln Highway, DeKalb, IL 60115
Telephone: 815-756-3398
Single \$24.36 Double \$31.02

Oxford Inn (10 minutes by car from campus)

State Route 23 (at Oakland), DeKalb, IL 60115
Telephone: 815-756-3552
Single \$51.06 Double \$57.72

Best Western Concord Inn (20 minutes by car from campus)

Highway 251 and I-88, Rochelle, IL 61068
Telephone: 815-562-5551
Single \$55.11 Double \$62.20

Super 8 Motel (20 minutes by car from campus)

601 Highway 38, Rochelle, IL 61068
Telephone: 815-562-2468
Single \$38.40 Double \$46.95

Food Service

There are several restaurants and fast food establishments within walking distance of campus. A list of local restaurants will be available at the Registration Desk.

Parking

Free parking is available in parking lots S and 38 located west of DuSable Hall. Leave a note on your windshield indicating that you are attending the AMS meeting. Enter lots S and 38 from Annie Glidden Road. Parking is likely to be at a premium on campus at this time because of several construction projects. Do not use other parking lots without first obtaining a visitor's permit from Campus Parking Services.

Travel and Local Information

Northern Illinois University is located in DeKalb, Illinois, 65 miles west of Chicago on the East-West Tollway (I-88) and 35 miles southeast of Rockford on Route 38. The campus is one and one-half miles north of I-88 on Annie Glidden Road, which is the second DeKalb exit if traveling on I-88 from the east and the first DeKalb exit if approaching from the west.

The DeKalb Limousine Service provides transportation to and from either O'Hare or Midway International Airports. A one-way trip to or from O'Hare costs \$35 per person, and to or from Midway the cost is \$45 per person. These rides are cheaper when the limousine is shared. Prior reservations are required. Call 800-892-2988 or 815-758-0631. Visa, MasterCard and American Express are accepted.

Weather

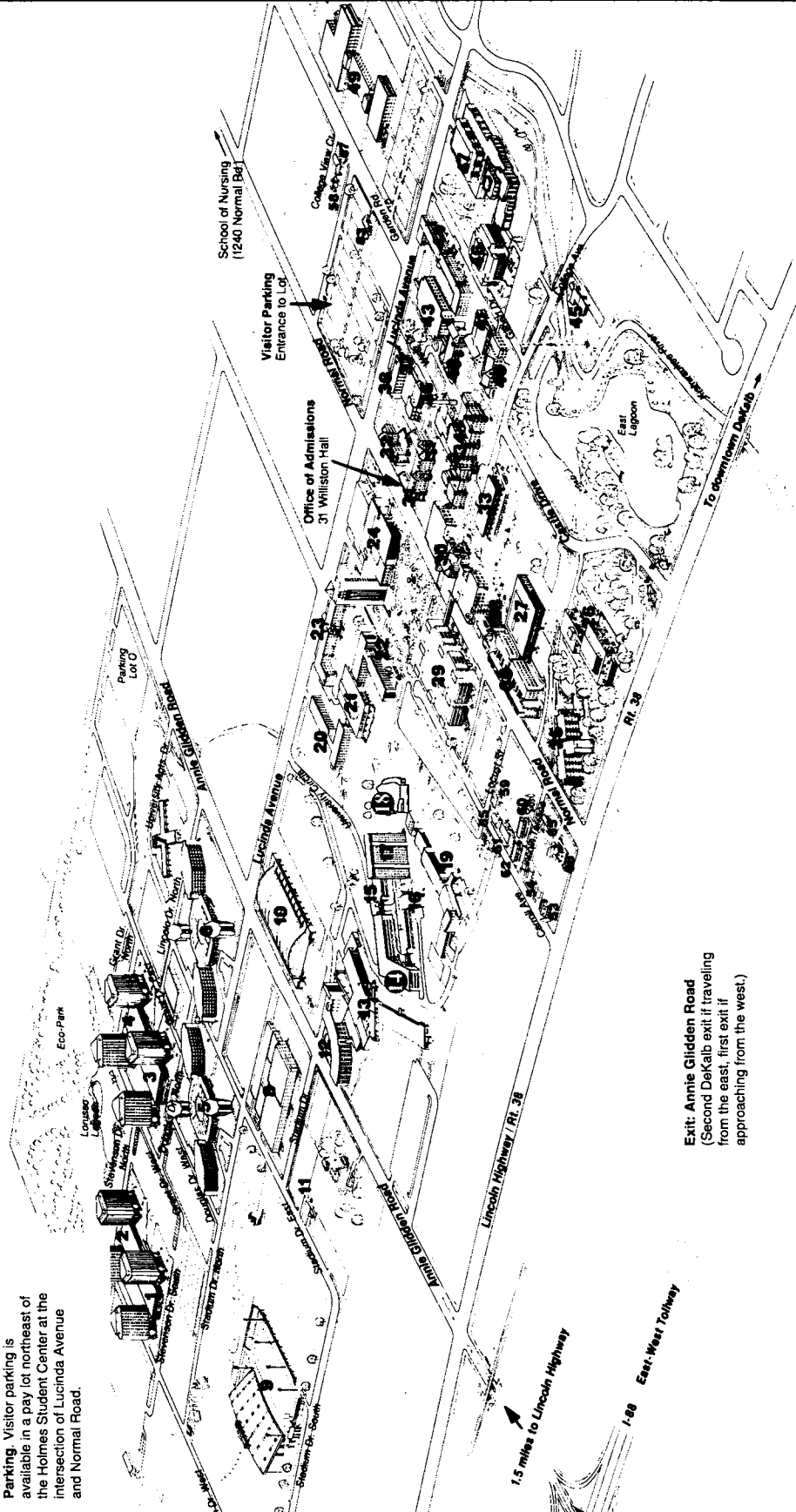
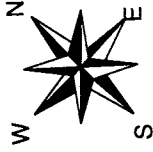
The weather in northern Illinois in mid-May is unpredictable. Temperatures might be as high as the high 70s or as low as the mid-50s (Fahrenheit). It is recommended that participants bring clothes appropriate to either extreme, as well as for the possibility of rain.

Northern Illinois University

Directions to NIU. NIU's main campus in DeKalb, Illinois is located one mile north of the East-West Tollway (I-88). The city is also accessible via state highways 38 and 23. First-time visitors exiting from the East-West Tollway are advised to use the Annie Glidden exit as this is the most clearly marked approach to the campus.

Academic Buildings
 18 Cole Hall
 14 DuSable Hall

Parking. Visitor parking is available in a pay lot northeast of the Holmes Student Center at the intersection of Lucinda Avenue and Normal Road.



Exit: Annie Glidden Road
 (Second DeKalb exit if traveling from the east, first exit if approaching from the west.)

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Program of the Sessions

The time limit for each contributed paper in the sessions is ten minutes. In the special sessions, the time limit varies from session to session and within sessions. To maintain the schedule, time limits will be strictly enforced.

Abstracts of papers presented in the sessions at this meeting will be found in the June 1993 issue of *Abstracts of papers presented to the American Mathematical Society*, ordered according to the numbers in parentheses following the listings below.

For papers with more than one author, an asterisk follows the name of the author who plans to present the paper at the meeting.

Thursday, May 20

Special Session on Combinatorics, I

1:00 p.m.–3:50 p.m.

- 1:00 p.m. *On jumping constant conjecture for multigraphs.*
(1) **Vojtech Rödl**, Emory University, and **Alexander Sidorenko***, Courant Institute of Mathematical Sciences, New York University (882-05-174) (Sponsored by Zoltan Füredi)
- 1:30 p.m. *Incidence posets of trees in posets of large dimension.*
(2) **Graham R. Brightwell**, London School of Economics, England, and **William T. Trotter***, Bellcore, Morristown, New Jersey (882-06-162) (Sponsored by Zoltan Füredi)
- 2:00 p.m. *Negative density results in Euclidean Ramsey Theory.*
(3) **R. L. Graham**, AT&T Bell Laboratories, Murray Hill, New Jersey (882-05-140)
- 2:30 p.m. *On a problem of embedding graphs into the plane.*
(4) **Mario Szegedy**, AT&T Bell Laboratories, Murray Hill, New Jersey (882-05-160) (Sponsored by Zoltan Füredi)
- 3:00 p.m. *Some geometric applications of extremal graph theory.*
(5) **János Pach**, Courant Institute of Mathematical Sciences, New York University (882-05-154) (Sponsored by Zoltan Füredi)
- 3:30 p.m. *Inequalities on codes with restricted distances.*
(6) **Richard M. Wilson**, California Institute of Technology (882-05-157) (Sponsored by Zoltan Füredi)

Special Session on Analytic Number Theory, I

1:00 p.m.–3:50 p.m.

- 1:00 p.m. *Schur's partition theorem, companions, refinements and generalizations.*
(7) **Krishnaswami Alladi***, University of Florida, Gainesville, and **Basil Gordon**, University of California, Los Angeles (882-11-06) (Sponsored by George E. Andrews)
- 1:30 p.m. *Normality to non-integer bases.*
(8) **Andrew D. Pollington**, Brigham Young University (882-11-122)

- 2:00 p.m. *On divisors of sums of integers.*
(9) **A. Sárközy**, Mathematical Institute of the Hungarian Academy of Sciences, Hungary, and **C. L. Stewart***, University of Waterloo (882-11-15)
- 2:30 p.m. *On an additive question related to one of Erdős.*
(10) **Andrew D. Pollington**, Brigham Young University, and **R. C. Vaughan***, Imperial College of Science & Technology, England (882-11-151)
- 3:00 p.m. *Binary additive problems concerning primes and the circle method.*
(11) **Daniel A. Goldston**, San Jose State University (882-11-172)
- 3:30 p.m. *An additive problem of Erdős with highly composite summands. Preliminary report.*
(12) **Hugh L. Montgomery**, University of Michigan, Ann Arbor (882-11-35)

Friday, May 21

Special Session on Combinatorics, II

8:00 a.m.–10:50 a.m.

- 8:00 a.m. *On generalizations of the deBruijn-Erdős Theorem.*
(13) **Hunter S. Snevily**, California Institute of Technology (882-05-175)
- 8:30 a.m. *New constructions of bipartite graphs on m, n vertices, with many edges, and without small cycles.*
(14) **Felix Lazebnik***, University of Delaware, **V. A. Ustimenko**, Kiev State University, Ukraine, and **A. J. Woldar**, Villanova University (882-05-94)
- 9:00 a.m. *Turan type results for graphs with many triangles.*
(15) **P. Erdős**, Hungarian Academy of Science, Hungary, **Z. Füredi**, University of Illinois, Urbana-Champaign, **R. Gould** and **D. S. Gunderson***, Emory University (882-05-187)
- 9:30 a.m. *On Erdős problem about bandwidth of graphs.*
(16) **Jianfang Wang**, Academia Sinica, People's Republic of China, **Douglas B. West***, University of Illinois, Urbana-Champaign, and **Bing Yang**, Northwest Normal University, China (882-05-163) (Sponsored by Zoltan Füredi)
- 10:00 a.m. *Hadwiger's conjecture for K_6 -free graphs.*
(17) **Robin Thomas**, Georgia Institute of Technology (882-05-161) (Sponsored by Zoltan Füredi)

Friday, May 21 (cont'd)

- 10:30 a.m. *Eigenvalues and separators of graphs.*
(18) **Fan R.K Chung**, Bellcore, Morristown, New Jersey
(882-05-176)

Special Session on Number Theory, I

8:30 a.m.–10:50 a.m.

- 8:30 a.m. *Transcendence and dependence via continued fractions.*
(19) **Edward B. Burger**, Williams College (882-11-125)
- 9:00 a.m. *On the uniform distribution of Kronecker sequences.*
(20) Preliminary report.
Jozsef Beck, Rutgers University, New Brunswick
(882-11-71) (Sponsored by Michael A. Filaseta)
- 9:30 a.m. *When are elliptic curves almost periodic?*
(21) **Richard K. Guy**, University of Calgary (882-11-132)
- 10:00 a.m. *The scarcity of squarefree binomial coefficients.*
(22) **Andrew J. Granville***, University of Georgia, and
Olivier Ramaré, Institute for Advanced Study
(882-11-124)
- 10:30 a.m. *Polynomial exponential equations.*
(23) **Wolfgang Schmidt**, University of Colorado, Boulder
(882-11-131)

**Special Session on Advances In Linear Algebra:
Theory, Computation, Application, I**

8:30 a.m.–10:50 a.m.

- 8:30 a.m. *Regions in the complex plane containing the eigenvalues of a matrix.* Preliminary report.
(24) **Richard A. Brualdi*** and **Stephen Mellendorf**,
University of Wisconsin, Madison (882-15-120)
- 9:00 a.m. *The periodic Schur decomposition. Algorithms and applications.* Preliminary report.
(25) **Paul VanDooren**, University of Illinois,
Urbana-Champaign (882-65-109) (Sponsored by
Gregory S. Ammar)
- 9:30 a.m. *A parallel divide and conquer algorithm for the generalized real symmetric definite tridiagonal eigenproblem.* Preliminary report.
(26) **Carlos F. Borges** and **William B. Gragg***, Naval
Postgraduate School (882-65-118) (Sponsored by
Gregory S. Ammar)
- 10:00 a.m. *Advances in the numerical algebraic eigenproblem.*
(27) Preliminary report.
Zhonggang Zeng, Northern Illinois University
(882-65-106)
- 10:30 a.m. *Eigenvalue and inverse eigenvalue problems for Toeplitz matrices.* Preliminary report.
(28) **Santosh Kumar Mohanty*** and **Gregory S. Ammar**,
Northern Illinois University (882-65-110)

Special Session on Function Theory, I

8:30 a.m.–10:20 a.m.

- 8:30 a.m. *Ahlfors α -regular curves and bilipschitz homogeneity.*
(29) Preliminary report.
David A. Herron*, University of Cincinnati, and
Manouchehr Ghamsari, Christopher Newport
University (882-30-87)
- 9:00 a.m. *Holder conditions on the reciprocal of the density of the hyperbolic metric.* Preliminary report.
(30) **C. David Minda**, University of Cincinnati (882-30-19)
- 9:30 a.m. *Chebyshev polynomials and discrete groups.*
(31) **F. W. Gehring***, University of Michigan, Ann Arbor and
University of Texas, Austin, and **G. J. Martin**,
University of Auckland, New Zealand (882-30-75)
- 10:00 a.m. *Proof of an extremal property of Chebyshev polynomials conjectured by P. Erdős.*
(32) **Alex Eremenko**, Purdue University, West Lafayette
(882-30-144)

Invited Address

11:00 a.m.–11:50 a.m.

- (33) *Chaos in dynamical systems.*
Clark Robinson, Northwestern University
(882-34-186)

Invited Address

1:30 p.m.–2:20 p.m.

- (34) *Trees, Hausdorff dimension, and probability.*
Russell Lyons, Indiana University, Bloomington
(882-05-130)

Special Session on Analytic Number Theory, II

3:00 p.m.–4:20 p.m.

- 3:00 p.m. *How to improve a Rosser-Iwaniec sieve estimate.*
(35) **Roger Baker**, Brigham Young University (882-11-36)
(Sponsored by Andrew J. Granville)
- 3:30 p.m. *Functions associated with sieves.*
(36) **H. Halberstam***, **H. Diamond**, University of Illinois,
Urbana-Champaign, and **H.-E. Richert**, University of
Ulm, Germany (882-11-150)
- 4:00 p.m. *Functions associated with sieves, II.*
(37) **Harold G. Diamond***, **H. Halberstam**, University of
Illinois, Urbana-Champaign, and **H.-E. Richert**,
University of Ulm, Germany (882-11-08)

Special Session on Beautiful Graph Theory, I

3:00 p.m.–4:20 p.m.

- 3:00 p.m. *Digraph homomorphisms.*
(38) **Pavol Hell**, Simon Fraser University (882-05-90)

3:30 p.m. *The number of edges in a maximal triangle-free graph.*
(39) **Curtis Barefoot**, New Mexico Institute of Technology,
Karen Casey, **David Fisher**, **Kathryn Fraughnaugh***,
University of Colorado, Denver, and **Frank Harary**,
New Mexico State University, Las Cruces (882-05-152)

4:00 p.m. *4-cockades and inverse sign patterns.*
(40) **Richard A. Brualdi**, University of Wisconsin, Madison
(882-05-129)

Special Session on Advances In Linear Algebra:
Theory, Computation, Application, II

3:00 p.m.–5:20 p.m.

3:00 p.m. *Numerical minimization of the Landau-deGennes free
(41) energy liquid crystals.* Preliminary report.
Chuck Gartland* and **Tim Davis**, Kent State
University, Kent (882-65-116)

3:30 p.m. *Interior-point methods for matrix linear programming
(42) problems.* Preliminary report.
L. Faybusovich, University of Notre Dame
(882-58-107)

4:00 p.m. *Distances and conditioning in computational control.
(43) Preliminary report.*
Ralph Byers, University of Kansas (882-93-121)

4:30 p.m. *Feedback stabilization of a second-order system: A
(44) nonmodal approach.*
Biswa Nath Datta* and **Fernando Rincon**, Northern
Illinois University (882-93-105) (Sponsored by Gregory
S. Ammar)

5:00 p.m. *A cell structure for the set of autoregressive systems.
(45) Joachim Rosenthal**, University of Notre Dame, and
Xiaochang Wang, Texas Tech University (882-93-88)

Special Session on Stochastic Processes, I

3:00 p.m.–6:20 p.m.

3:00 p.m. *Branching processes in varying environments.
(46) Russell Lyons*, Indiana University, Bloomington
(882-60-76)

3:30 p.m. *Regular conditional probabilities and a linear
(47) birth-death predator-prey process.*
John Coffey, Purdue University, Calumet Campus
(882-60-09)

4:00 p.m. *Limiting behavior of the connectivity function of
(48) oriented percolation with long range.* Preliminary
report.
Bao Nguyen*, Illinois Institute of Technology, and
Wei-Shih Yang, Temple University (882-60-05)

4:30 p.m. *Operator valued weight functions on the torus:
(49) Factorization and invariant subspaces.*
Ray Cheng, University of Louisville (882-60-03)

5:00 p.m. *Stochastic modeling of seismic records based on
(50) deterministic formulations.*
G. R. Dargahi-Noubary, Bloomsburg University of
Pennsylvania (882-60-13)

5:30 p.m. *AR cyclostationary processes and period uncertainty.
(51) Peter J. Sherman*, Iowa State University (882-60-148)
(Sponsored by Mohsen Pourahmadi)

6:00 p.m. *Stochastic analysis for measuring income inequality
(52) and poverty.*
Ibrahim A. Ahmad, Northern Illinois University
(882-60-92) (Sponsored by Mohsen Pourahmadi)

Special Session on Function Theory, II

3:00 p.m.–4:50 p.m.

3:00 p.m. *A sharp norm estimate for the conjugate function.
(53) Matts Essen*, Uppsala University, Sweden, **Daniel
Shea***, University of Wisconsin, Madison, and **Charles
Stanton**, California State University, San Bernardino
(882-42-99)

3:30 p.m. *Some local properties of the solutions of second-order
(54) differential equations.* Preliminary report.
Jiuyi Cheng* and **John Rossi**, Virginia Polytechnic
Institute and State University (882-30-62)

4:00 p.m. *Computation of Nevanlinna error terms.* Preliminary
(55) report.
Peter Hall, University of Alabama, Tuscaloosa
(882-30-44)

4:30 p.m. *The best error terms of classical functions.
(56) Linda Sons and Zhuan Ye**, Northern Illinois
University (882-30-145)

Special Session on Probabilistic Methods, I

3:00 p.m.–4:20 p.m.

3:00 p.m. *Minimal absolute values of random trigonometric
(57) polynomials.*
A. M. Odlyzko, AT&T Bell Laboratories, Murray Hill,
New Jersey (882-60-103)

3:30 p.m. *A normal law for matchings.* Preliminary report.
(58) **Jeff Kahn**, Rutgers University, New Brunswick
(882-05-167)

4:00 p.m. *On random matchings in regular graphs.
(59) Jeff Kahn and Jeong Han Kim**, Rutgers University,
New Brunswick (882-05-166)

Special Session on Discrete Groups, I

3:00 p.m.–4:50 p.m.

3:00 p.m. *The elliptic order algorithm.
(60) Jane Gilman*, Rutgers University, Newark (882-20-74)

3:30 p.m. *Discreteness conditions in $PU(2, 1)$, I.
(61) Robert Miner** and **Ara Basmajian**, University of
Oklahoma (882-51-137)

4:00 p.m. *Discreteness conditions in $PU(2, 1)$, II.
(62) Ara Basmajian** and **Robert Miner**, University of
Oklahoma (882-51-138)

4:30 p.m. *Strange action of cocompact 3-hyperbolic groups on
(63) H^3 and spaces fibering over closed hyperbolic
3-manifolds.* Preliminary report.
Boris Apanasov, University of Oklahoma (882-57-37)

Friday, May 21 (cont'd)

Special Session on Mathematical Topics in Fluid Dynamics, I

3:00 p.m.–5:50 p.m.

- 3:00 p.m. *Fractal dimension of short trajectories from the non-Newtonian attractor.* Preliminary report. (64) **J. Necas***, Northern Illinois University, and **J. Malek**, Charles University, Czechoslovakia (882-35-31) (Sponsored by Hamid Bellout)
- 3:30 p.m. *Singular nonlinear Schrödinger limits.* (65) **Paul K. Newton**, University of Illinois, Urbana-Champaign (882-76-17)
- 4:00 p.m. *Young measure-valued solutions for non-Newtonian incompressible fluids.* Preliminary report. (66) **H. Bellout***, **F. Bloom** and **J. Necas**, Northern Illinois University (882-35-30)
- 4:30 p.m. *Advection of a passive scalar by dipolar vortex couple.* (67) **Andrew J. Bernoff*** and **Joseph F. Lingeitch**, Northwestern University (882-76-33) (Sponsored by Susan J. Friedlander)
- 5:00 p.m. *Attractors of non-Newtonian and bipolar viscous fluids.* Preliminary report. (68) **Frederick Bloom**, Northern Illinois University (882-76-66) (Sponsored by Susan J. Friedlander)
- 5:30 p.m. *Renormalisation group theory for similarity solutions of the second kind in porous medium flow and the propagation of turbulence.* (69) **Nigel Goldenfeld**, University of Illinois, Urbana-Champaign (882-76-68) (Sponsored by Susan J. Friedlander)

Special Session on Combinatorics, III

4:30 p.m.–5:50 p.m.

- 4:30 p.m. *Asymptotic enumeration of full graphs.* (70) **D. J. Kleitman***, **F. Lasaga** and **L. J. Cowen**, Massachusetts Institute of Technology (882-05-153)
- 5:00 p.m. *Graph generated union-closed families and the union-closed sets conjecture.* (71) **Emanuel Knill**, Los Alamos National Laboratory (882-05-155)
- 5:30 p.m. *Two-part shadows.* (72) **G. O. H. Katona**, University of Illinois, Urbana-Champaign and Mathematical Institute of Hungarian Academy of Sciences, Hungary (882-05-173) (Sponsored by Zoltan Furedi)

Session on Theory of Numbers

4:30 p.m.–5:55 p.m.

- 4:30 p.m. *Power reciprocity of Jacobi sums.* (73) **Charles Helou**, Pennsylvania State University, Delaware County Campus (882-11-34)

- 4:45 p.m. *On Sidon sequences of even orders.* (74) **Sheng Chen**, Southwest Texas State University (882-11-38)
- 5:00 p.m. *Primes of the fifth cyclomatic field.* Preliminary report. (75) **Andrew J. Lazarus**, Berkeley, California (882-11-86)
- 5:15 p.m. *Ramanujan's formulas for the coefficients in the expansions of certain modular forms.* Preliminary report. (76) **Paul Bialek**, University of Illinois, Urbana-Champaign (882-11-168)
- 5:30 p.m. *A generalized approach to the $3x + 1$ problem.* Preliminary report. (77) **Stephen M. Zernan**, Pennsylvania State University, University Park (882-11-170)
- 5:45 p.m. *Unified algorithm to find existent units in algebraic number fields of the form $Q(w)$.* Preliminary report. (78) **Malvina Baica**, University of Wisconsin, Whitewater (882-12-139)

Saturday, May 22

Special Session on Beautiful Graph Theory, II

8:00 a.m.–9:20 a.m.

- 8:00 a.m. *Groupies in graphs.* Preliminary report. (79) **John Mackey**, University of Hawaii, Honolulu (882-05-04)
- 8:30 a.m. *A family of sparse graphs of large sum number.* (80) **Nora Hartsfield***, Western Washington University, and **W. F. Smyth**, McMaster University (882-05-189)
- 9:00 a.m. *How chordal graphs work.* (81) **Terry McKee**, Wright State University, Dayton (882-05-51)

Special Session on Stochastic Processes, II

8:00 a.m.–10:50 a.m.

- 8:00 a.m. *Poisson and Poisson process approximations for random tournaments.* Preliminary report. (82) **Anant P. Godbole*** and **Jinghua Qian**, Michigan Technological University (882-60-32)
- 8:30 a.m. *Necessary and sufficient conditions for L^p convergence of sums of independent random variables.* (83) **Nasrollah Etemadi**, University of Illinois, Chicago (882-60-70)
- 9:00 a.m. *Empirical distribution functions and strong approximation theorems for dependent random variables.* (84) **Walter Philipp**, University of Illinois, Urbana-Champaign (882-60-26)
- 9:30 a.m. *Differential geometrical structures related to forecasting error variance ratios.* (85) **Daming Xu**, University of Oregon (882-60-133)
- 10:00 a.m. *Lyanpunov exponent of the stochastic harmonic oscillator.* (86) **Mark Pinsky**, Northwestern University (882-60-14)

- 10:30 a.m. *Random walks on the free groups and homogeneous trees.*
(87) **Steven P. Lalley**, Purdue University, West Lafayette (882-60-97)

Special Session on Probabilistic Methods, II

8:00 a.m.–9:20 a.m.

- 8:00 a.m. *On the distribution of sums of residues.*
(88) **Jerrold R. Griggs**, University of South Carolina, Columbia (882-11-190)
- 8:30 a.m. *An upper bound for the solvability probability of a random stable roommates instance.*
(89) **Robert W. Irving**, University of Glasgow, Scotland, and **Boris Pittel***, Ohio State University, Columbus (882-05-55) (Sponsored by David L. Gross)
- 9:00 a.m. *Connectedness and isolated points.*
(90) **Rod Canfield**, University of Georgia (882-05-180)

Special Session on Analytic Number Theory, III

8:30 a.m.–10:50 a.m.

- 8:30 a.m. *Application of the Bombieri-Sperber construction to estimating hybrid exponential sums on quasiprotective varieties over finite fields.*
(91) **C. J. Mozzochi**, Princeton University (882-11-48)
- 9:00 a.m. *New estimates for smooth Weyl sums.*
(92) **Trevor D. Wooley**, University of Michigan, Ann Arbor (882-11-12)
- 9:30 a.m. *A conjecture for the sixth moment of the zeta function.*
(93) **Brian Conrey**, Oklahoma State University, Stillwater (882-11-123)
- 10:00 a.m. *Estimates for L-functions.*
(94) **John B. Friedlander***, University of Toronto, **Bill Duke** and **Henryk Iwaniec**, Rutgers University, New Brunswick (882-11-149)
- 10:30 a.m. *Practical numbers.*
(95) **Adolf Hildebrand**, University of Illinois, Urbana-Champaign (882-11-22)

Special Session on Advances In Linear Algebra: Theory, Computation, Application, III

8:30 a.m.–10:50 a.m.

- 8:30 a.m. *A new method for wavepacket propagation.*
(96) Preliminary report.
Mark Arnold, Iowa State University (882-65-119) (Sponsored by Gregory S. Ammar)
- 9:00 a.m. *Recursive total least squares.* Preliminary report.
(97) **Daniel L. Boley**, University of Minnesota, Minneapolis (882-65-111)
- 9:30 a.m. *Fast solutions to ill-conditioned, banded toeplitz least squares problems.* Preliminary report.
(98) **James G. Nagy**, Southern Methodist University (882-65-115)

- 10:00 a.m. *Schur-like algorithms for the fast triangular factorization of general Hankel and Toeplitz matrices.*
(99) Preliminary report.
Roland W. Freund, AT&T Bell Laboratories, Murray Hill, New Jersey (882-65-112) (Sponsored by Gregory S. Ammar)

- 10:30 a.m. *Iterative refinement with parallel algorithms for toeplitz matrices.* Preliminary report.
(100) **I. Koltracht** and **D. Xiao***, University of Connecticut, Storrs (882-65-117) (Sponsored by Gregory S. Ammar)

Special Session on Function Theory, III

8:30 a.m.–10:50 a.m.

- 8:30 a.m. *A quadratic extremal problem on the Dirichlet space.*
(101) **Stephen D. Fisher**, Northwestern University (882-30-28)
- 9:00 a.m. *On very weak solutions of certain elliptic systems.*
(102) **John Lewis**, University of Kentucky (882-30-27)
- 9:30 a.m. *Normal families, derivatives, and uniformity.*
(103) Preliminary report.
Peter Lappan, Michigan State University (882-30-141)
- 10:00 a.m. *An inequality on the logarithmic derivative.*
(104) **Joseph Miles***, University of Illinois, Urbana-Champaign, and **John Rossi**, Virginia Polytechnic Institute and State University (882-30-142)
- 10:30 a.m. *Extremal functions in invariant subspaces of Bergman spaces.* Preliminary report.
(105) **Peter Duren***, University of Michigan, Ann Arbor, **Dmitry Khavinson**, University of Arkansas, Fayetteville, and **Harold S. Shapiro**, Royal Institute of Technology, Sweden (882-30-63)

Special Session on Discrete Groups, II

9:00 a.m.–10:20 a.m.

- 9:00 a.m. *The numerical computation of the Douady-Earle extension and Teichmuller mappings.*
(106) **Taipng Ye**, University of Connecticut, Storrs (882-30-50)
- 9:30 a.m. *Cohomology of mapping class groups.* Preliminary report.
(107) **Henry H. Glover**, **Guido Mislin**, Ohio State University, Columbus, and **Yining Xia***, Northwestern University (882-55-49)
- 10:00 a.m. *Random walk on Teichmuller space.* Preliminary report.
(108) **Howard Masur**, University of Illinois, Chicago (882-30-85)

Special Session on Mathematical Topics in Fluid Dynamics, II

9:00 a.m.–10:50 a.m.

- 9:00 a.m. *Singularities in surface tension driven flows.*
(109) **Andrea Bertozzi***, **Michael Brenner**, **Todd F. Dupont** and **Leo P. Kadanoff**, University of Chicago (882-76-67)

Saturday, May 22 (cont'd)

- 9:30 a.m. *Singular limit problems in conservation laws.*
(110) **Gui-Qiang Chen**, University of Chicago (882-35-40)
- 10:00 a.m. *On the local and global behaviour of solutions to the singular parabolic equation $u_t = \Delta \ln u$.*
(111) **E. DiBenedetto**, Northwestern University (882-76-96)
(Sponsored by Susan J. Friedlander)
- 10:30 a.m. *Energy dissipation without viscosity in ideal hydrodynamics.*
(112) **Gregory L. Eyink**, University of Illinois, Urbana-Champaign (882-76-95) (Sponsored by Susan J. Friedlander)

Session on Analysis, Geometry, Probability

9:00 a.m.–10:25 a.m.

- 9:00 a.m. *Topological properties of some vector valued sequence spaces generated by infinite matrices.*
(113) Preliminary report.
Nandita Rath, Washington State University (882-40-100)
- 9:15 a.m. *A characterization of the second dual of $C_0(S, A)$.*
(114) **Stephen Choy***, National University of Singapore, Singapore, and **James Wong**, University of Calgary (882-46-01)
- 9:30 a.m. *The Bourgain algebra of the algebra of generalized analytic functions.* Preliminary report.
(115) **Toma V. Tonev**, University of Montana (882-46-135)
- 9:45 a.m. *Compact Hankel and Toeplitz operators on $C \times D$.*
(116) **Charles Lin**, **Fudong Chen*** and **Bin Yan**, University of Illinois, Chicago (882-47-82)
- 10:00 a.m. *On lifts of structure satisfying $F^{K+1} - a^2 F^{K-1} = 0$.*
(117) **Lovejoy Das**, Kent State University (882-53-47)
- 10:15 a.m. *Estimation of parameters from two-truncation parameter families.*
(118) **Kandasamy Selvavel**, Claflin College (882-62-91)

Special Session on Combinatorics, IV

9:30 a.m.–10:50 a.m.

- 9:30 a.m. *Lower bounds for chromatic numbers of hypergraphs. The topological method.*
(119) **Igor Kriz**, Chicago University (882-05-164)
(Sponsored by Zoltan Furedi)
- 10:00 a.m. *The crossing number of a graph on a compact 2-manifold.*
(120) **F. Shahrokhi**, **O. Sýkora**, **L. A. Székely*** and **I. Vrto**, University of New Mexico (882-05-159)
- 10:30 a.m. *Some recent developments of the Erdős Ginzburg Ziv theorem.*
(121) **A. Bialostocki**, University of Idaho (882-05-169)

Special Session on History of Mathematics, I

9:30 a.m.–10:50 a.m.

- 9:30 a.m. *The role of Catherine the Great in the development of mathematics education in Russia.* Preliminary report.
(122) **Irving H. Anellis**, Modern Logic Publishing, Iowa (882-01-53)
- 10:00 a.m. *Euler's early use of trigonometric series.*
(123) **Ronald William Golland**, Nalco Chemical Company, Illinois (882-01-84)
- 10:30 a.m. *The richness of the history of geometry in the 19th century.*
(124) **Louise Ahnrdt Golland**, University of Chicago (882-01-83)

Invited Address

11:00 a.m.–11:50 a.m.

- (125) *Instabilities in fluid motion.*
Susan Friedlander*, University of Illinois, Chicago, and **Misha Vishik**, University of Texas, Austin (882-76-45)

Special Session on Combinatorics, V

1:00 p.m.–2:20 p.m.

- 1:00 p.m. *Addition of residue classes modulo p^n .*
(126) **Béla Bollobás**, University of Cambridge, England (882-11-158)
- 1:30 p.m. *What is the structure of $A + A$ if $A + A$ is large?*
(127) **Vera T. Sós**, Hungarian Academy of Science, Hungary (882-11-156) (Sponsored by Zoltan Furedi)
- 2:00 p.m. *On a problem of Rohrbach for finite groups.*
(128) **Xing-De Jia**, Southwest Texas State University (882-11-80)

Special Session on Analytic Number Theory, IV

1:00 p.m.–2:20 p.m.

- 1:00 p.m. *The number of steps in the Euclidean algorithm.*
(129) **Doug Hensley**, Texas A & M University, College Station (882-11-11)
- 1:30 p.m. *Some remarks on the prime number theorem.*
(130) **P.D.T.A. Elliott**, University of Colorado, Boulder (882-11-24)
- 2:00 p.m. *Radial analogues of the Beurling-Selberg functions.*
(131) **Jeffrey J. Holt** and **Jeffrey D. Vaaler***, University of Texas, Austin (882-11-07)

Special Session on Mathematical Topics in Fluid Dynamics, III

1:00 p.m.–5:50 p.m.

- 1:00 p.m. *Anisotropy in Hele-Shaw flow.*
(132) **Robert Almgren**, University of Chicago (882-76-42)
- 1:30 p.m. *WKB and spectral problems, arising in hydrodynamics.*
(133) **Misha M. Vishik**, University of Texas, Austin (882-76-64)
- 2:00 p.m. *Center manifold equations from hydrodynamics.*
(134) **Robert E.L. Turner**, University of Wisconsin, Madison (882-76-20)
- 2:30 p.m. *Crystalline liquids in shear flow: A laboratory for nonequilibrium phenomena.*
(135) **Paul M. Goldbart***, University of Illinois, Urbana-Champaign, and **Peter D. Olmsted**, Exxon Research and Engineering Company, Annandale, New Jersey (882-76-89) (Sponsored by Susan J. Friedlander)
- 3:00 p.m. Informal Discussion
- 3:30 p.m. *Local hydrodynamic instabilities in rotating stars.*
(136) **Norman R. Lebovitz***, University of Chicago, and **Alexander Lifschitz**, University of Illinois, Chicago (882-76-41) (Sponsored by Susan J. Friedlander)
- 4:00 p.m. *Alfvénic perturbations in a stellar wind with a spiral magnetic field in the equatorial plane.*
(137) **Yu-Qing Lou**, University of Chicago (882-76-72) (Sponsored by Susan J. Friedlander)
- 4:30 p.m. *Wave packets, bifurcations and chaos in geophysical flows.*
(138) **Huijun Yang**, University of Chicago (882-76-65) (Sponsored by Susan J. Friedlander)
- 5:00 p.m. *Nonlinear restrictions on turbulent transport and dynamo action.*
(139) **Fausto Cattaneo***, **Louis Tao** and **Samuel I. Vainshtein**, University of Chicago (882-76-39) (Sponsored by Susan J. Friedlander)
- 5:30 p.m. *Comparative study of nonaxisymmetric instabilities of axisymmetric equilibria in fluids and plasmas.*
(140) **Eliezer Hameiri**, Courant Institute of Mathematical Sciences, New York University, and **Alexander Lifschitz***, University of Illinois, Chicago (882-76-43) (Sponsored by Anatoly S. Libgaber)

General Session

1:00 p.m.–2:25 p.m.

- 1:00 p.m. *Mathematics in the Sulbas: Geometry and geometric algebra.*
(141) **R. N. Kalia**, Saint Cloud State University (882-01-98)
- 1:15 p.m. *Bezout and semiheditary power series rings.*
(142) **Delors Herbera**, Rutgers University, New Brunswick (882-16-188)
- 1:30 p.m. *Further results of The Channel Assignment Problem.*
(143) **Daphne D. Liu**, California State University, Los Angeles (882-05-128) (Sponsored by Michael J. Hoffman)
- 1:45 p.m. *On diameters of the generalized prisms.*
(144) **Weizhen Gu***, Southwest Texas State University, and **Songlin Tian**, Central Missouri State University (882-05-46)

- 2:00 p.m. *Structure of the set of closure operators on a given set.*
(145) **Marcin Schroeder**, Southern Illinois University, Carbondale (882-06-184)
- 2:15 p.m. *Mazes with more than one printmouse.*
(146) **Ponnammal Natarajan**, Anna University, India (882-68-73)

Special Session on Advances In Linear Algebra: Theory, Computation, Application, IV

1:30 p.m.–3:20 p.m.

- 1:30 p.m. *Adaptive iterative methods for linear systems of equations.* Preliminary report.
(147) **Daniela Calvetti**, Stevens Institute of Technology (882-65-114)
- 2:00 p.m. *Convergence results for the block-symmetric Gauss-Seidel iteration for the non-symmetric case: An application to the convection-diffusion equation.* Preliminary report.
(148) **R. E. Bank**, University of California at San Diego, La Jolla, and **Mohamed Benbouenane***, Northern Illinois University (882-65-108)
- 2:30 p.m. *Generalized ADI iteration.* Preliminary report.
(149) **Lothar Reichel**, Kent State University, Kent (882-65-113)
- 3:00 p.m. *On iterative convergence of matrix equations.* Preliminary report.
(150) **Teck-Cheong Lim**, George Mason University (882-15-52) (Sponsored by David H. Singman)

Special Session on Stochastic Processes, III

1:30 p.m.–4:50 p.m.

- 1:30 p.m. *On the completeness of the spectral domain for harmonizable processes.*
(151) **Abol G. Miamee** and **Bernd S. W. Schroeder***, Hampton University (882-28-69)
- 2:00 p.m. *An example of a periodically correlated sequence whose spectral domain is not complete.* Preliminary report.
(152) **A. Makagon*** and **H. Salehi**, Michigan State University (882-60-81)
- 2:30 p.m. *Prediction and moving average representation for strongly harmonizable processes.*
(153) **Marc H. Mehlman**, University of Pittsburgh, Johnstown (882-60-143)
- 3:00 p.m. Informal Discussion
- 3:30 p.m. *Inference for heavy tailed distributions.*
(154) **K. B. Athreya**, **S. N. Lahiri**, Iowa State University, and **Wei Wu***, University of Illinois, Urbana-Champaign (882-60-23)
- 4:00 p.m. *Random polynomials.*
(155) **K. Farahmand**, University of Ulster, Northern Ireland (882-60-02)
- 4:30 p.m. *Alan Turing and the central limit theorem.*
(156) **Sandy Zabell**, Northwestern University (882-01-177)

Saturday, May 22 (cont'd)

Special Session on Discrete Groups, III

1:30 p.m.–2:50 p.m.

- 1:30 p.m. *Iterated commutator for a Fuchsian group.*
(157) **F. W. Gehring***, University of Michigan, Ann Arbor and University of Texas, Austin, and **G. J. Martin**, University of Auckland, New Zealand (882-30-78)
- 2:00 p.m. *Complex projective structures with given monodromy.*
(158) **M. Kapovich**, University of Utah (882-30-29)
- 2:30 p.m. *Remarks on a remark of Jorgenson.* Preliminary report.
(159) **Bernard Maskit**, State University of New York, Stony Brook (882-30-93)

Special Session on History of Mathematics, II

2:00 p.m.–4:45 p.m.

- 2:00 p.m. *Lie's "Galois theory of differential equations" I: Historical background.* Preliminary report.
(160) **Uta C. Merzbach**, LHM Institute and Smithsonian Institution (882-01-127)
- 2:45 p.m. Informal Discussion
- 3:00 p.m. *Lie's "Galois theory of differential equations" II: Lie.*
(161) **T. Christine Stevens**, Saint Louis University (882-01-134)
- 3:45 p.m. Informal Discussion
- 4:00 p.m. *Lie's Galois theory of differential equations: III The algebraic approach.* Preliminary report.
(162) **Phyllis Joan Cassidy**, Smith College (882-01-21)

Special Session on Number Theory, II

2:30 p.m.–5:50 p.m.

- 2:30 p.m. *Extensions of Freiman's inverse theorem in additive number theory.*
(163) **Melvyn B. Nathanson**, Herbert H. Lehman College, City University of New York (882-11-58)
- 3:00 p.m. *The order of a typical matrix.*
(164) **Eric Schmutz**, Drexel University (882-11-61)
- 3:30 p.m. *On the solvability of the equation $x + y = z^2$ in the finite partition of integers.*
(165) **Endre Szemerédi**, Rutgers University, New Brunswick (882-11-18) (Sponsored by Michael A. Filaseta)
- 4:00 p.m. *Complementing sets of integers.*
(166) **R. Tijdeman**, University of Leiden, Netherlands (882-11-59)
- 4:30 p.m. *On the distribution of squarefull numbers in short intervals.*
(167) **Michael Filaseta** and **Ognian Trifonov***, University of South Carolina, Columbia (882-11-171)
- 5:00 p.m. *Expressing a positive integer as a sum of a given number of distinct squares of positive integers.*
(168) **Paul T. Bateman***, **Adolf Hildebrand** and **George B. Purdy**, University of Illinois, Urbana-Champaign (882-11-136)

- 5:30 p.m. *Upper bounds for B_3 -sequences.*
(169) **S. W. Graham**, Michigan Technological University (882-11-25)

Special Session on Beautiful Graph Theory, III

2:30 p.m.–5:20 p.m.

- 2:30 p.m. *The color permuting group of an isomorphic factorization.*
(170) **Allen J. Schwenk**, Western Michigan University (882-05-185)
- 3:00 p.m. *Bounds on the double domination number of a graph.*
(171) **Frank Harary**, New Mexico State University, and **Teresa Haynes***, East Tennessee State University (882-05-104)
- 3:30 p.m. *Some results on independent distance domination in graphs.* Preliminary report.
(172) **Lowell W. Beineke***, Indiana University-Purdue University, Ft. Wayne, and **Michael A. Henning**, University of Natal, Republic of South Africa (882-05-147)
- 4:00 p.m. *If a graph appears symmetrical must it be symmetrical?*
(173) **Russell Lyons**, Indiana University, Bloomington (882-05-79)
- 4:30 p.m. *Graphical factorizations.*
(174) **Mike Plantholt**, Illinois State University (882-05-101)
- 5:00 p.m. *Some methods of destroying the automorphisms of a graph.*
(175) **Frank Harary**, New Mexico State University, Las Cruces (882-05-102)

Special Session on Probabilistic Methods, III

3:00 p.m.–5:20 p.m.

- 3:00 p.m. *A random representation of the complete bipartite graph.*
(176) **Zoltán Füredi**, University of Illinois, Urbana-Champaign (882-05-182)
- 3:30 p.m. *On the Lovasz local lemma.* Preliminary report.
(177) **Jozsef Beck**, Rutgers University, New Brunswick (882-05-56) (Sponsored by Joel H. Spencer)
- 4:00 p.m. *Embedding bounded degree trees into graphs.*
(178) **Endre Szemerédi**, Rutgers University, New Brunswick (882-05-165) (Sponsored by Zoltan Furedi)
- 4:30 p.m. *First-order properties of random substructures.*
(179) **Miklos Ajtai**, IBM Almaden Research Center, San Jose, California (882-05-183) (Sponsored by Joel H. Spencer)
- 5:00 p.m. *Threshold for collapsibility in random graphs.* Preliminary report.
(180) **E. M. Palmer** and **Joseph J. Spencer***, Michigan State University (882-05-57)

Sunday, May 23

Special Session on Number Theory, III

9:00 a.m.–11:20 a.m.

- 9:00 a.m. *Equality among number-theoretic functions.*
(181) **Solomon W. Golomb**, University of Southern California (882-11-16)
- 9:30 a.m. *On composite n satisfying $\psi(n) \equiv 1 \pmod{n}$.* Preliminary report.
(182) **M. V. Subbarao**, University of Alberta (882-11-60)
- 10:00 a.m. *Some aspects of Carmichael numbers and the Erdős-AGP gap.*
(183) **William R. Alford**, University of Georgia (882-11-178)
- 10:30 a.m. *Density bounds for the $3x+1$ problem.* Preliminary report.
(184) **David Applegate** and **Jeffrey C. Lagarias***, AT&T Bell Laboratories, Murray Hill, New Jersey (882-11-10)
- 11:00 a.m. *On some problems of Paul Erdős.*
(185) **John L. Selfridge**, Northern Illinois University (882-11-126)

Special Session on Probabilistic Methods, IV

9:00 a.m.–10:50 a.m.

- 9:00 a.m. *Asymptotic bases for numbers by probability methods.*
(186) **Prasad Tetali**, AT&T Bell Laboratories, Murray Hill, New Jersey (882-11-54) (Sponsored by Joel H. Spencer)
- 9:30 a.m. *Eigenvalues and routing in graphs.*
(187) **Fan R. K. Chung**, Bellcore, Morristown, New Jersey (882-05-181)
- 10:00 a.m. *The Janson inequalities.*
(188) **Joel Spencer**, Courant Institute of Mathematical Sciences, New York University (882-05-179)
- 10:30 a.m. *Bounds on the expected number of k -sets.*
(189) **William Steiger**, Rutgers University, New Brunswick (882-52-146) (Sponsored by Joel H. Spencer)

Andy R. Magid
Associate Secretary
Norman, Oklahoma

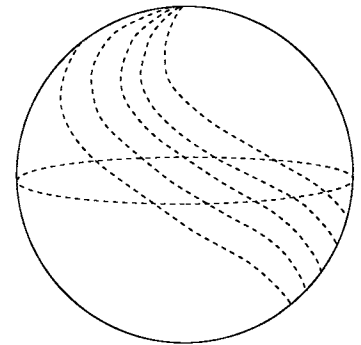
CONTEMPORARY MATHEMATICS

Representation Theory of Groups and Algebras

Ronald L. Lipsman, Jeffrey Adams, Rebecca A. Herb, Stephen S. Kudla,
Jian-Shu Li, and Jonathan M. Rosenberg, Editors
Volume 145

Touching on virtually every important topic in modern representation theory, this book contains proceedings of the activities of the Representation Theory Group at the University of Maryland at College Park during the years 1989–1992. Covered here are the latest results in the field, providing a readable introduction to the work of some of the best young researchers in representation theory. The book spans a very broad spectrum—for example, within real representation theory, both semisimple and nonsemisimple analysis are discussed; within C^* -algebras, both geometric and nongeometric approaches are studied. In addition, the articles are exceptionally well written and range from research papers aimed at specialists to expository articles accessible to graduate students.

1991 *Mathematics Subject Classification*: 22, 46
ISBN 0-8218-5168-3, 491 pages (softcover), March 1993
Individual member \$30, List price \$50, Institutional member \$40
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International Joint Mathematics Meetings

Vancouver, British Columbia, Canada, August 15–19, 1993

Supplement to Announcement in April Notices

Please refer to the First Announcement for this meeting, which begins on page 366 in the April 1993 issue of the *Notices*. The Important Deadlines from the preliminary announcement are reproduced for convenience. The forms for Preregistration/Tours/Hotel, Walter Gage Residence reservations, and MAA Minicourses are located at the back of this issue.

Joint AMS-CMS Sessions

The title of the Joint Invited Address to be given by **Robert E. Gompf** has been changed to *Cutting and pasting with symplectic manifolds*.

The Joint Invited Address to be given by **Jill C. Pipher** is titled *Harmonic analysis techniques for higher order elliptic operators*.

AMS Sessions

The Special Session on *Random knotting and linking* is co-organized by **De Witt L. Sumners**, Florida State University.

Activities of Other Organizations

The panel discussion on *Affirmative action* cosponsored by the **Association for Women in Mathematics** and the **CMS Committee on Women in Mathematics** is being organized by **Cora Sadosky**, Howard University, and **Asia I. Weiss** (CMS Committee Chair), York University.

The **Joint Policy Board for Mathematics** public address scheduled for Tuesday evening has been cancelled.

Gage Residence Accommodations

The rates listed in the first announcement for Walter Gage Residence are for **rooms only** and do not include any meals.

IMPORTANT DEADLINES

AMS-CMS Special Session Abstracts	Expired
AMS Abstracts	
For Consideration for Special Sessions	Expired
Of Contributed Papers	May 18
MAA Abstracts of Contributed Papers	May 7
ORDINARY Preregistration	June 11
Hotel Accommodations (MMSB)	June 11
Tickets through Preregistration	June 11
MAA Minicourse Preregistration (MAA)	June 11
Hotel Changes and Cancellations (MMSB)	July 1
Gage Residence Accommodations (UBC)	July 12
Motions for AMS Business Meeting	July 16
CMS General Meeting Notices of Motion	July 19
FINAL Preregistration (no hotel or tickets)	July 19
Cancellations for all Banquets and Tours (50% refund)	August 2
Gage Residence Accommodation Cancellations (less CDN\$15 fee) (UBC)	48 hours before arrival
Preregistration Cancellations (50% refund)	August 11

ADVANCES IN SOVIET MATHEMATICS

Nonlinear Stokes Phenomena

Yu. S. Il'yashenko, Editor

Volume 14

The nonlinear Stokes phenomenon occurs in the local theory of differential equations (or, more concisely, local dynamics) and finds application in singularity theory. This book contains a number of papers on this subject, including a survey that begins with Stokes' pioneering works on linear theory and discusses the work of Voronin.

1991 *Mathematics Subject Classification*: 32, 34, 35, 58; 43

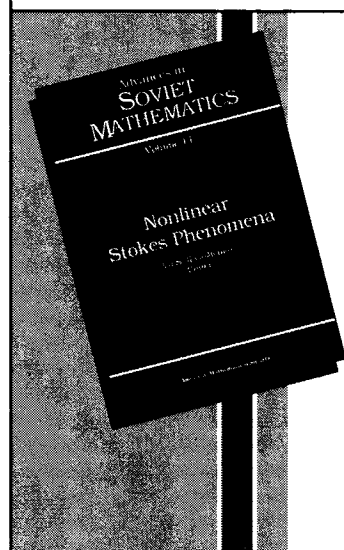
ISBN 0-8218-4112-2, 287 pages (hardcover), February 1993

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Syracuse University, Syracuse, New York

September 18–19, 1993

First Announcement

The eight hundred and eighty-fourth meeting of the American Mathematical Society (AMS) will be held on the campus of Syracuse University, Syracuse, New York, on Saturday, September 18, and Sunday, September 19, 1993. Special sessions and sessions for contributed papers will be held in the Carnegie Building, and invited addresses will be held in the auditorium of the Heroy Building.

Invited Addresses

By invitation of the Eastern Section Program Committee there will be four invited one-hour addresses. The speakers, their affiliations, and the titles of their talks where available are:

Michael Christ, University of California, Los Angeles, *Analytic hypoellipticity, nonlinear eigenvalues, and nilpotent group representations.*

Tadeusz Iwaniec, Syracuse University, *title to be announced.*

Charles A. McGibbon, Wayne State University, *title to be announced.*

James M. Renegar, Cornell University, *Complexity aspects of solving polynomial equations and inequalities.*

Alvany Rocha, Graduate School & University Center (CUNY), *title to be announced.*

Special Sessions

By invitation of the same committee there will be ten special sessions of selected twenty-minute papers. The topics of these sessions and the names and affiliations of the organizers are as follows:

Geometric topology, **Douglas R. Anderson**, Syracuse University.

Algebraic topology, **Robert Bruner**, Wayne State University, and **Charles A. McGibbon**.

Commutative algebra and algebraic geometry, **Steven P. Diaz**, Syracuse University, and **Anthony V. Geramita**, Queen's University.

Harmonic analysis, **Allan Greenleaf**, University of Rochester, and **Robert S. Strichartz**, Cornell University.

Differential geometry and global analysis, **Wu-Teh Hsiang**, Syracuse University.

Representations of finite dimensional algebras, **Mark Kleiner** and **Dan Zacharia**, Syracuse University.

Nonlinear potential theory, **Juan J. Manfredi**, University of Pittsburgh.

Topics in probability, **Terry R. McConnell**, Syracuse University.

Computational problems involving polynomials, **Paul Pedersen** and **James M. Renegar**, Cornell University.

Lie theoretic methods in mathematical physics, **Alvany Rocha**.

Abstracts for consideration for these sessions should have been submitted by the **April 27, 1993**, deadline. This deadline was previously published in the Invited Speakers and Special Sessions section of the *Notices*.

Contributed Papers

There will also be sessions for contributed ten-minute papers. Abstracts should be prepared on the standard AMS form available from the AMS office in Providence or in Departments of Mathematics. Abstracts should be sent to the Abstracts Coordinator, Meetings Department, American Mathematical Society, Post Office Box 6887, Providence, Rhode Island 02940, so as to arrive before the **May 18, 1993**, abstract deadline. Participants are reminded that a charge of \$16 is imposed for retyping abstracts that are not in camera-ready form. Late papers will not be accommodated.

Electronic Submission of Abstracts

This service is available to those who use the \TeX typesetting system and can be used with abstracts of papers to be presented at the sectional meetings of the AMS. Requests to obtain the package of these files may be sent electronically to abs-request@math.ams.org. Requesting the files electronically will likely be the fastest and most convenient way, but users may also obtain the package on IBM or Macintosh diskettes, available free of charge by writing to the AMS Abstracts Coordinator at the address stated above. When requesting the abstracts package, users should be sure to specify whether they want the plain \TeX , \AMS-TeX , or the \LATEX package.

Registration

The meeting registration desk will be located on the west side of the second-floor reading room near the Department of Mathematics office and will be open from 8:00 a.m. to 5:00 p.m. on Saturday, September 18, and 8:00 a.m. to noon on Sunday, September 19. The registration fees are \$30 for members of the AMS, \$45 for nonmembers, and \$10 for emeritus members, students, or unemployed mathematicians.

Meetings

Accommodations

Rooms have been blocked for participants at the Sheraton University Inn and the Genesee Inn. Both hotels are within walking distance of the meeting buildings. The Sheraton University Inn is approximately one-third of a mile, and the Genesee Inn is approximately two-thirds of a mile from Carnegie. The Genesee Inn provides shuttle to the campus. Non-smoking rooms are available in both hotels upon request. Participants should make their own arrangements with the hotel of their choice and ask for the AMS regional meeting rate. All rates are subject to applicable tax. **The AMS is not responsible for rate changes or the quality of the accommodations offered by these hotels/motels.**

Sheraton University Inn

801 University Avenue, PO Box 8701, Syracuse, NY 13210-8701

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Single \$89 Double \$97

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Genesee Inn

1060 East Genesee Street, Syracuse, NY 13210

Telephone: 800-365-4663 or 315-476-4212

Single \$52 Double \$59

Reservations must be made by August 27, 1993.

Food Service

A number of eating establishments are located along Marshall Street within walking distance of Carnegie Building, and several campus eateries will be open. A list of local restaurants will be available at the Registration Desk.

Parking

Free parking is available in Parking Lots Q3 and Q4. Enter lot Q3 from Sims Drive and Q4 from College Place.

Travel and Local Information

Syracuse University is located in Syracuse, New York, which is at the approximate geographic center of New York State. Hancock International Airport is located approximately ten miles north of campus, and is served by a number of major airlines. MetroPlex (315-455-2695) provides taxi and shuttle service from the airport. Taxi fare to the Sheraton University Inn or the Genesee Inn is approximately \$15. Shuttle service leaves the airport 15 minutes after the hour. Shuttle fare is approximately \$5.

Rail passenger service to Syracuse is provided by Amtrak. For those travelling by car to Syracuse, the New York State Thruway (I-90) is the main East-West route, and I-81 is the main North-South route. The campus is located approximately one mile southeast of the Adams Street exit of I-81.

Weather

In September the average daily high temperature is 73°F and the average daily low temperature is 53°F. Daily weather conditions are highly changeable and rain should be expected.

Lesley M. Sibner
Associate Secretary
Brooklyn, New York

CBMS Issues in Mathematics Education, Volume 3

Mathematicians and Education Reform 1990-1991

Naomi D. Fisher, Harvey B. Keynes, and Philip D. Wagreich, Editors

The first part of this volume is devoted to detailed descriptions of a wide variety of educational projects undertaken by mathematicians. These descriptions focus for the most part on substantial enterprises with an investment of several years and systematic review and evaluation. By contrast, the second part of the book centers on ideas that could be put into action at a modest level as a springboard for longer term projects. This book is intended to stimulate and inspire mathematical scientists to pursue educational work. Educators also benefit from this exploration of what can be done.

ISBN 0-8218-3503-3, 185 pages (softcover), April 1993

Individual member \$37, List price \$62

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International Joint Mathematics Meeting Heidelberg, Germany, October 1–3, 1993

First Announcement



Heidelberg Castle

The first joint meeting of the American Mathematical Society (AMS) and the Deutsche Mathematiker-Vereinigung (DMV) will be held at the University of Heidelberg, Heidelberg, Germany, from Friday, October 1, to Sunday, October 3, 1993.

Joint Program Committee

The members of the Joint Program Committee are Klaus D. Bierstedt, Joachim Cuntz, Albrecht Dold, Robert Fossum, Dale Husemoller, Norbert Schappacher, Friedrich Tomi, and Bernd Ulrich.

Local Organizing Committee

The members of the Local Organizing Committee are Joachim Cuntz, Albrecht Dold, Yvonne Dold, Norbert Quien, A. Stevens, Friedrich Tomi, and N. Weber.

Invited Addresses

By invitation of the Joint Program Committee there will be six invited one-hour addresses. The speakers, their affiliations,

and the titles of their talks where available are:

Gerd Faltings, Princeton University, *title to be announced*.

Guenter Harder, Universität Bonn, *title to be announced*.

Helmut H. W. Hofer, Universitaet Bochum, *title to be announced*.

Michael J. Hopkins, Massachusetts Institute of Technology, *title to be announced*.

Vaughan F. R. Jones, University of California, Berkeley, *title to be announced*.

Robert P. Langlands, Institute for Advanced Study, *title to be announced*.

Special Sessions

By invitation of the same committee there will be eleven special sessions of selected twenty-minute papers. The topics of these sessions and the names and affiliations of the organizers are as follows:

Recursion theory, **Klaus Ambos-Spies**, University of Heidelberg, and **Steffen Lempp**, University of Wisconsin.

Optimization, **Hans Georg Bock**, University of Heidelberg, and **Martin Grötschel**, ZIB, Berlin.

Commutative algebra (Betti numbers), **Ragnar-Olaf Buchweitz**, University of Toronto.

Operator algebras, **Joachim Cuntz**, University of Heidelberg.

Complex analysis, **Klas Diederich**, Gesamthochschule Wuppertal, and **John Fornæss**, University of Michigan.

Geometry and computer visualization, **George Francis**, University of Illinois, Urbana-Champaign; **M. Phillips**, University of Minnesota; and **Norbert Quinn**, University of Heidelberg.

Arithmetic geometry/automorphic forms, **Jens S. Franke**, Max Planck Institute; **Guenter Harder**, Universität Bonn; and **Norbert Schappacher**, University Louis-Pasteur.

Mathematical physics, **Jurg Frölich**, ETH Zurich, and **Elliot Lieb**, Princeton University.

Homotopy theory, **Hans-Werner Henn**, University of Heidelberg, and **Michael Hopkins**, Massachusetts Institute of Technology.

Modelling in science, **Willi Jäger**, University of Heidelberg, and **Paul C. Fife**, University of Utah.

Stochastics, **Hermann Rost**, University of Heidelberg, and **Ruth Williams**, University of California, San Diego.

Abstracts for consideration for these sessions should be submitted by the **May 27, 1993**, deadline.

Contributed Papers

There will also be sessions for contributed ten-minute papers. Abstracts should be prepared on the standard AMS form available from the AMS office in Providence or in Departments of Mathematics. Abstracts should be sent to the Abstracts Coordinator, Meetings Department, American Mathematical Society, Post Office Box 6887, Providence, Rhode Island 02940, **so as to arrive before the June 17, 1993, abstract deadline**. Participants are reminded that a charge of \$16 is imposed for retyping abstracts that are not in camera-ready form. Late papers will not be accommodated.

Electronic Submission of Abstracts

This service is available only to those submitting abstracts for contributed paper sessions who use the \TeX typesetting system. Requests to obtain the package of these files may be sent by e-mail to abs-request@math.ams.org. Requesting the files electronically will likely be the fastest and most convenient way, but users may also obtain the package on IBM or Macintosh diskettes, available free of charge by writing to the Abstracts Coordinator at the address stated above. When requesting the abstracts package users should be sure to specify whether they want the plain \TeX , \AMS-TeX , or the \LATEX package.

Registration

The preregistration fees are 50 DM for members of the AMS and DMV, and 70 DM for nonmembers. **The deadline for preregistration is July 15**, after which the fees will increase by 20 DM. The preregistration form can be found in the back of this issue. Payment for preregistration can be made by Visa, MasterCard, EuroCard, or Diners Club. The only acceptable form of payment by check is a Foreign Draft (certified check in DM). Please note that banks will charge a fee when issuing a Foreign Draft.

Social Events

The mayor of Heidelberg, Beate Weber, will host a complimentary reception in the Heidelberg City Hall on Friday, October 1, at 8:00 p.m.

There will be a conference dinner at the Marstallhof der Universität on Saturday, October 2, at 8:00 p.m. The number of tickets available is limited and participants are urged to purchase tickets through preregistration. The cost of each ticket is 60 DM.

Accommodations

Participants should make their arrangements for hotel reservations through the Heidelberg Convention and Visitors Bureau and use the reservation form following this announcement. The Convention Bureau will assign hotel rooms according to the category indicated on the reservation form. All hotel rates include breakfast. **The deadline for reservations is August 15. After this date rooms will be reserved on a space-available basis. The AMS is not responsible for rate changes or the quality of the accommodations offered by these hotels/motels.**

Hotel Categories: Rooms in categories A through D have private bathrooms with shower/bath and WCs. Rooms in category E should have hot and cold water and shared bathroom facilities located on each floor. All hotels are a short commute to the University via public or private transportation.

Student Rooms: A limited number of student rooms located throughout Heidelberg will be available starting in July. Please note that the rates cover the period October 1 through October 15. Room rates are 95 DM per person for a double room with shared bathroom facilities and 185 DM per person for a single room with private bathroom.

Room rates will not be prorated for shorter periods of stay. To make reservations for a student room contact the Heidelberg Convention and Visitors Bureau, Friedrich-Ebert-Anlage 2, Germany, P. O. Box 10 58 60, D-6900 Heidelberg 1, or phone 49 6221 10821.

Travel

Frankfurt Airport is the closest airport to Heidelberg and is served by most major airlines. There are frequent train connections to Heidelberg, as well as a more convenient limousine service (80 DM for a roundtrip fare) and a Lufthansa airport shuttle (36 DM one way; 60 DM roundtrip).

Invited Addresses and Special Sessions

Invited Addresses at AMS Meetings

The individuals listed below have accepted invitations to address the Society at the times and places indicated. For some meetings the list of speakers is incomplete. Please check the table of contents for full announcements or programs of meetings happening in the near future. Invited addresses at Sectional Meetings are selected by the Section Program Committee, usually twelve to eighteen months in advance of a meeting. Members wishing to nominate candidates for invited addresses should send the relevant information to the Associate Secretary for the Section who will forward it to the Section Program Committee.

College Station, TX, October 1993

Steven P. Lalley	Theodore A. Slaman
Gilles Pisier	Stephan A. Stolz

Claremont, CA, November 1993

Krzysztof Burdzy	N. Makarov
Nassif Ghoussoub	Nicholai Reshetikhin

Cincinnati, OH, January 1994

Michael Artin (Retiring Presidential Address)	Robert M. May (Gibbs Lecture)
Subrahmanyan Chandrasekhar (AMS-MAA)	Carl Pomerance
Jacques C. Hurtubise	Gilbert Strang
James M. Hyman	Ruth J. Williams

Brooklyn, NY, April 1994

David Bayer	Debasis Mitra
Peter B. Kronheimer	Nicholai Reshetikhin

Organizers and Topics of Special Sessions

The list below contains all the information about Special Sessions at meetings of the Society available at the time this issue of the *Notices* went to the printer.

October 1993 Meeting in College Station, Texas

Central Section
Associate Secretary: Andy R. Magid

Deadline for organizers: Expired

Deadline for consideration: July 14, 1993

Josefina Alvarez, *Harmonic analysis and its applications*

Harold P. Boas, Al Boggess, and Emil J. Straube, *Several complex variables*

Randall K. Campbell-Wright, Carl C. Cowen, and Barbara D. MacCluer, *Composition operators on spaces of analytic functions*

Alfonso Castro, Joseph A. Iaia, John W. Neuberger, and Henry A. Warchall, *Nonlinear partial differential equations*

Goong Chen and Jianxin Zhou, *Control systems governed by partial differential equations*

Tim D. Cochran, Lorenzo A. Sadun, and Philip B. Yasskin, *Texas geometry and topology*

William E. Fitzgibbon and J. J. Morgan, *Reaction diffusion systems*

David R. Larson, *Non self adjoint operator algebras*

Edward S. Letzter, *Representation theory and geometry of noncommutative algebras*

John C. Meakin, Amitai Regev, Mark V. Sapir, and Samuel M. Vovsi, *Identities and varieties of algebraic structures*

Efton L. Park, *Noncommutative differential geometry*

Gilles Pisier and Thomas Schlumprecht, *The geometry of Banach spaces and operator spaces*

Sung Yell Song and Paul M. Terwilliger, *Algebraic combinatorics*

November 1993 Meeting in Claremont, California Western Section

Associate Secretary: Lance W. Small

Deadline for organizers: Expired

Deadline for consideration: July 14, 1993

Fred Brauer and Carlos Castillo-Chavez, *Mathematical methods in epidemiology*

Stavros N. Busenberg and Mario U. Martelli, *Dynamical systems and chaos*

Stavros N. Busenberg and Ellis Cumberbatch, *Industrial applied mathematics*

David G. Cantor, *Computational number theory*

Steven N. Evans, *Brownian motion and applications to potential theory*

Nassif Ghoussoub and Edward Odell, *Nonlinear analysis and Banach space theory*

Nicholai Reshetikhin, *Quantum groups and quantum topology*

December 1993 Meeting in Merida, Mexico

(Joint Meeting with the Sociedad
Matematica Mexicana)

Associate Secretary: Robert M. Fossum

Deadline for organizers: Expired

Deadline for consideration: July 14, 1993

January 1994 Meeting in Cincinnati, Ohio

Associate Secretary: Robert J. Daverman

Deadline for organizers: Expired

Deadline for consideration: September 9, 1993

March 1994 Meeting in Lexington, Kentucky

Southeastern Section

Associate Secretary: Robert J. Daverman

Deadline for organizers: June 18, 1993

Deadline for consideration: To be announced

March 1994 Meeting in Manhattan, Kansas

Central Section

Associate Secretary: Andy R. Magid

Deadline for organizers: June 25, 1993

Deadline for consideration: To be announced

Andrew G. Bennett and Charles N. Moore, *Harmonic analysis and probability*

Andrew L. Chermak and Albert L. Delgado, *Groups and geometries*

Louis Crane and David N. Yetter, *Quantum topology*

Lev Kapitanski and Lige Li, *Nonlinear topics and critical phenomena in partial differential equations*

Zongzhu Lin and David B. Surowski, *Representations of algebraic groups and quantum groups*

Gabriel Nagy and Vladimir V. Peller, *Operator theory*

Joseph M. Rosenblatt, *Convergence problems in ergodic theory*

Misha Vishnik, *Dynamical systems and fluid dynamics*

Hunan Yang and Qisu Zou, *Computational mathematics and numerical analysis*

April 1994 Meeting in Brooklyn, New York

Eastern Section

Associate Secretary: Lesley M. Sibner

Deadline for organizers: July 9, 1993

Deadline for consideration: To be announced

June 1994 Meeting in Eugene, Oregon

Western Section

Associate Secretary: Lance W. Small

Deadline for organizers: September 7, 1993

Deadline for consideration: To be announced

August 1994 Meeting in Minneapolis, Minnesota

Associate Secretary: Lesley M. Sibner

Deadline for organizers: November 15, 1993

Deadline for consideration: To be announced

October 1994 Meeting in Stillwater, Oklahoma

Central Section

Associate Secretary: Andy R. Magid

Deadline for organizers: January 28, 1994

Deadline for consideration: To be announced

November 1994 Meeting in Richmond, Virginia

Southeastern Section

Associate Secretary: Robert J. Daverman

Deadline for organizers: February 11, 1994

Deadline for consideration: To be announced

January 1995 Meeting in San Francisco, California

Associate Secretary: Andy R. Magid

Deadline for organizers: April 2, 1994

Deadline for consideration: To be announced

March 1995 Meeting in Chicago, Illinois

Central Section

Associate Secretary: Andy R. Magid

Deadline for organizers: June 24, 1994

Deadline for consideration: To be announced

November 1995 Meeting in Kent, Ohio

Central Section

Associate Secretary: Andy R. Magid

Deadline for organizers: February 4, 1995

Deadline for consideration: To be announced

January 1996 Meeting in Orlando, Florida

Associate Secretary: Lance W. Small

Deadline for organizers: April 12, 1995

Deadline for consideration: To be announced

March 1996 Meeting in Iowa City, Iowa

Central Section

Associate Secretary: Andy R. Magid

Deadline for organizers: June 22, 1995

Deadline for consideration: To be announced

Daniel D. Anderson, *Commutative ring theory*

Information for Organizers

Potential organizers should refer to the January, February, March, or April issues of the *Notices* for guidelines on organizing a session. Proposals for any of the meetings mentioned in the preceding section should be sent to the cognizant Associate Secretary by the deadline indicated. No Special Sessions can be approved too late to provide adequate advance notice to members who wish to participate.

Western Section

Lance W. Small, Associate Secretary
Department of Mathematics
University of California, San Diego
La Jolla, CA 92093
Electronic mail: g_small@math.ams.org
(Telephone 619-534-3590)

Central Section

Andy R. Magid, Associate Secretary
Department of Mathematics
University of Oklahoma
601 Elm PHSC 423
Norman, OK 73019
Electronic mail: g_magid@math.ams.org
(Telephone 405-325-6711)

Eastern Section

Lesley M. Sibner, Associate Secretary
Department of Mathematics
Polytech University of New York
Brooklyn, NY 11201-2990
Electronic mail: g_sibner@math.ams.org
(Telephone 718-260-3505)

Invited Addresses and Special Sessions

Southeastern Section

Robert J. Daverman, Associate Secretary
Department of Mathematics
University of Tennessee
Knoxville, TN 37996-1300
Electronic mail: g.daverman@math.ams.org
(Telephone 615-974-6577)

Proposals for Special Sessions at the December 1–4, 1993 meeting in Merida, Mexico, only, should be sent to Robert M. Fossum at the Department of Mathematics, University of Illinois, Urbana, IL 61801, Telephone: 217-244-1741, e-mail: rmf@math.ams.org.

Information on site selection for Sectional Meetings, as well as full instructions for submitting abstracts, can be found in the January, February, March, or April issues of the *Notices*.

CONTEMPORARY MATHEMATICS

Several Complex Variables in China

Chung-Chun Yang and Sheng Gong, Editors
Volume 142

The present collection of survey and research articles comprises a current overview of research in several complex variables in China. Among the topics covered are singular integrals, function spaces, differential operators, and factorization of meromorphic functions in several complex variables via analytic or geometric methods. Some results are reported in English for the first time.

1991 *Mathematics Subject Classification*: 32

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Mark Sheingorn and Marvin Knopp, Editors
Volume 143

Emil Grosswald was a mathematician of great accomplishment and remarkable breadth of vision. This volume pays tribute to the span of his mathematical interests, which is reflected in the wide range of papers collected here. With contributions by some of the leading contemporary researchers in number theory, modular functions, combinatorics, and related analysis, this book will interest graduate students and specialists in these fields. The high quality of the articles and their close connection to current research trends make this volume a must for any mathematics library.

1991 *Mathematics Subject Classification*: 05, 11, 14, 33

ISBN 0-8218-5155-1, 612 pages (softcover), March 1993

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Call For Topics For 1995 Conferences

Suggestions are invited from mathematicians, either singly or in groups, for topics for the various conferences that will be organized by the Society in 1995. The deadlines for receipt of these suggestions are given below, as well as some relevant information about each of the conferences. An application form to be used when submitting suggested topic(s) for any of these conferences (except the Short Course Series) may be obtained by writing to the Director of Meetings, American Mathematical Society, P.O. Box 6887, Providence, RI 02940; or by telephone: 401-455-4146; FAX 401-455-4004; e-mail: meet@math.ams.org.

Individuals willing to serve as organizers should be aware that the professional conference coordinators in the Society's Providence office will provide full support and assistance before, during, and after each of these conferences, thereby relieving the organizers of most of the administrative detail. Organizers should also note that for all conferences, except Summer Research Conferences, it is required that the proceedings be published by the AMS, and that proceedings of Summer Research Conferences are frequently published. A member of the Organizing Committee must be willing to serve as editor of the proceedings.

All suggestions must include (1) the names and affiliations of proposed members and the chair of the Organizing Committee; (2) a one- to two-page description addressing the focus of the topic, including the importance and timeliness of the topic, and estimated attendance; (3) a list of the recent conferences in the same or closely related areas; (4) a tentative list of names and affiliations of the proposed principal speakers; and (5) a list of likely candidates who would be invited to participate, and their current affiliations. Individuals submitting conference suggestions are requested to recommend sites or geographic areas, which would assist the Meetings staff in their selection of an appropriate site.

1995 AMS Summer Research Institute

Summer Institutes are intended to provide an understandable presentation of the state of the art in an active field of research in pure mathematics and usually extend over a three-week period. Dates for a Summer Institute must not overlap those of the Society's summer meeting, which is scheduled for August. There should be a period of at least two weeks between them. Current and recent topics and organizers:

1990 – *Differential geometry*, **Robert E. Greene**, University of California, Los Angeles, and **Shing-Tung Yau**, Harvard University.

1991 – *Algebraic groups and their generalizations*, **William Haboush**, University of Illinois, Urbana-Champaign.

1992 – *Quadratic forms and division algebras: Connections with algebraic K-theory and algebraic geometry*, **William Jacob** and **Alex Rosenberg**, University of California, Santa Barbara.

1993 – *Stochastic analysis*, **Michael Cranston**, University of Rochester; **Richard T. Durrett**, Cornell University; and **Mark A. Pinsky**, Northwestern University.

Proposals will be considered by the Summer Institutes and Special Symposia Committee. Proceedings are published by the AMS as volumes in the series *Proceedings of Symposia in Pure Mathematics*.

Deadline for Suggestions: September 1, 1993

1995 AMS-SIAM-SMB Symposium

Some Mathematical Questions in Biology

This one-day symposium, sponsored jointly by the AMS, the Society for Industrial and Applied Mathematics (SIAM), and the Society for Mathematical Biology (SMB), is usually held in conjunction with the annual meeting of a biological society closely associated with the topic. Current and recent topics and organizers:

1990 – *Neural networks*, **Jack D. Cowan**, University of Chicago.

1991 – *Theoretical approaches for predicting spatial effects in ecological systems*, **Robert H. Gardner**, Oak Ridge National Laboratories.

1992 – *Cell biology*, **Byron Goldstein**, Los Alamos National Laboratory, and **Carla Wofsy**, University of New Mexico.

1993 – *Theories for the evolution of haploid-diploid life cycles*, **Mark Kirkpatrick**, University of Texas, Austin.

Proposals will be considered by the AMS-SIAM-SMB Committee on Mathematics in the Life Sciences. Papers from the symposia are published by the AMS as volumes in the series *Lectures on Mathematics in the Life Sciences*.

Deadline for Suggestions: September 1, 1993

1995 AMS-SIAM Summer Seminar in Applied Mathematics

The goal of the Summer Seminar, sponsored jointly by the AMS and the Society for Industrial and Applied Mathematics (SIAM), is to provide an environment and program in applied mathematics in which experts can exchange the latest ideas

and newcomers can learn about the field. Current and recent topics and organizers:

1990 – *Vortex dynamics and vortex methods*, **Claude Green-gard**, IBM T. J. Watson Research Center, and **Christopher R. Anderson**, University of California, Los Angeles.

1991 – No seminar held.

1992 – *Exploiting symmetry in applied and numerical analysis*, **Eugene L. Allgower**, **Kurt Georg**, and **Rick Miranda**, Colorado State University.

1993 – *The mathematics of tomography, impedance imaging, and integral geometry*, **Eric Todd Quinto**, Tufts University.

Proposals will be considered by the AMS-SIAM Committee on Applied Mathematics. Proceedings are published by the AMS as volumes in the series *Lectures in Applied Mathematics*.

Deadline for Suggestions: September 1, 1993

1995 AMS-IMS-SIAM Joint Summer Research Conferences in the Mathematical Sciences

These conferences, jointly sponsored by the AMS, the Institute for Mathematical Statistics (IMS), and the Society for Industrial and Applied Mathematics (SIAM), emulate the scientific structure of those held at Oberwolfach and represent diverse areas of mathematical activity, with emphasis on areas currently especially active. Careful attention is paid to subjects in which there is important interdisciplinary activity at present. A one-week or two-week conference may be proposed. Topics for the twelfth series of one-week conferences being held in 1993 are: *Curvature equations in conformal geometry*; *Multivariable operator theory*; *Spectral geometry*; *Recent developments in the inverse Galois problem*; *Mathematics of superconductivity*; *Distributions with fixed marginals, doubly stochastic measures, and Markov operators*; and *Applications of hypergroups and related measure algebras*.

Proposals will be considered by the AMS-IMS-SIAM Committee on Joint Summer Research Conferences in the Mathematical Sciences. If proceedings are published by the AMS they appear as volumes in the series *Contemporary Mathematics*.

Deadline For Suggestions: February 1, 1994

1995 AMS Short Course Series

The AMS Short Courses consist of a series of introductory survey lectures and discussions which take place over a period of two days prior to and during the Joint Mathematics Meetings held in January and August each year. Each theme is a specific area of applied mathematics or mathematics used in the study of a specific subject or collection of problems in one of the physical, biological, or social sciences, technology, or business. Current and recent topics:

Complex analytic dynamics (January 1994), *Wavelets and applications* (January 1993), *New scientific applications of geometry and topology* (January 1992), *Unreasonable effectiveness of number theory* (August 1991), *Probabilistic combinatorics and its applications* (January 1991), *Combinatorial games* (August 1990), *Mathematical questions in robotics* (January 1990).

Proposals will be considered by the Short Course Subcommittee (James J. Tattersall, Chair) of the Program Committee for National Meetings (Nancy K. Stanton, Chair). Proceedings are published by the Society as volumes in the series *Proceedings of Symposia in Applied Mathematics*, with the approval of the Editorial Committee.

Deadline for Suggestions: Suggestions for the January 1995 course should be submitted by **December 1, 1993**; suggestions for the August 1994 course should be submitted by **July 1, 1993**.

Submit suggestions to: AMS Director of Meetings, P.O. Box 6887, Providence, RI 02940; FAX: 401-455-4004; e-mail: meet@math.ams.org.

Mathematical Sciences Meetings and Conferences

THIS SECTION contains announcements of meetings and conferences of interest to some segment of the mathematical public, including *ad hoc*, local, or regional meetings, and meetings or symposia devoted to specialized topics, as well as announcements of regularly scheduled meetings of national or international mathematical organizations. A complete listing of meetings of the Society, and of meetings sponsored by the Society, will be found inside the front cover.

AN ANNOUNCEMENT will be published in the *Notices* if it contains a call for papers, and specifies the place, date, subject (when applicable), and the speakers; a second announcement will be published only if there are changes or necessary additional information. Once an announcement has appeared, the event will be briefly noted in each issue until it has been held and a reference will be given in parentheses to the month, year, and page of the issue in which the complete information appeared. Asterisks (*) mark those announcements containing new or revised information.

IN GENERAL, announcements of meetings and conferences held in North America carry only date, title of meeting, place of meeting, names of speakers (or sometimes a general statement on the program), deadlines for abstracts or contributed papers, and source of further information. Meetings held outside the North American area may carry more detailed information. In any case, if there is any application deadline with respect to participation in the meeting, this fact should be noted. All communications on meetings and conferences in the mathematical sciences should be sent to the Editor of the *Notices*, care of the American Mathematical Society in Providence, or electronically to notices@math.ams.org.

DEADLINES for entries in this section are listed on the inside front cover of each issue. In order to allow participants to arrange their travel plans, organizers of meetings are urged to submit information for these listings early enough to allow them to appear in more than one issue of the *Notices* prior to the meeting in question. To achieve this, listings should be received in Providence SIX MONTHS prior to the scheduled date of the meeting.

EFFECTIVE with the 1990 volume of the *Notices*, the complete list of Mathematical Sciences Meetings and Conferences will be published only in the September issue. In all other issues, only meetings and conferences for the twelve-month period following the month of that issue will appear. As new information is received for meetings and conferences that will occur later than the twelve-month period, it will be announced at the end of the listing in the next possible issue. That information will not be repeated until the date of the meeting or conference falls within the twelve-month period.

1993

1993–1994. **Mittag-Leffler Institute's Academic Program for 1993–1994: Topology and Algebraic K -theory**, Djursholm, Sweden. (Dec. 1992, p. 1274)

Spring 1993. **IMACS Symposium on Mathematical Modelling**, Wiener Neustadt, Germany. (Jan. 1992, p. 54)

1993. **Second IMACS International Conference on Computational Physics**, Univ. of Colorado, Boulder, CO. (Jan. 1992, p. 55)

May 1993

* 10–14. **Northwest European Analysis Seminar 1993**, International Conference and Research Center for Computer Science, Schloss Dagstuhl (Saarland).

PROGRAM: Set up in 1991 with the cooperation of mathematicians from more than 15 universities in the European North-

west (Holland, Belgium, France, Germany, Switzerland), the permanent Northwest European Analysis Seminar (NWEAS) will hold its second meeting as specified above (rotating every year through the mentioned NW countries). The purpose is to bring together specialists in different areas of analysis and its applications throughout the European Northwest for exchange and communication of results, problems, and perspectives concerning their research areas. The meetings of NWEAS are planned to be rather moderate in size, and are essentially by invitation. However any other interested mathematician can apply for invitation by contacting the organizers or writing to the addresses below; other such participants would have to be supported financially by their own institution/means. LECTURES: Each invited lecturer will give a 35–45 minute talk representative of his/her area of research by either presenting recent results or a survey. Other participants can actively contribute in the round-table sessions held during the meeting and can also

present a written abstract of at most one page to be circulated during the meeting.

INFORMATION: H. König, Universität des Saarlandes, Fachbereich Mathematik, D-6600 Saarbrücken; tel: (area 681) 302 4432; or G. Lumer, Inst. de Mathématique, Université de Mons, Place du Parc, 20, B-7000 Mons; tel: (area 65) 373507.

REMARK: The 1994 meeting of NWEAS will be held in Holland in the Spring of 1994.

* 13. **1993 Science and Technology Symposium on "Transportation and the Mathematical Sciences: The Changing Interaction"**, Washington, DC.

PROGRAM: The 1993 symposium will focus on the increasing use of the mathematical sciences in planning and operations for surface and air transportation.

CONFERENCE TOPICS: The relation between legal/policy issues and research issues as well as the roles of mathematics, statistics, and optimization in various areas of transportation.

INVITED SPEAKERS: G. Nemhauser (Georgia Inst. of Tech.), J. Del Balzo (Federal Aviation Administration), J. Henson (Federal Express), K. Heanue (Federal Highway Admin.), and E. Pas (Duke U.).

INFORMATION: Board on Math. Sciences, National Research Council, NAS 312, 2101 Constitution Ave., NW, Washington, DC 20418; 202-334-2421; Fax: 202-334-1597; internet: bms@nas.edu; bitnet: bms@nas.bitnet.

14–16. **Knots and Quantum Gravity**, University of California, Riverside, CA. (Feb. 1993, p. 180)

* 14–16. **Twenty-second Annual State of Jefferson Mathematics Congress**, Whiskeytown (Redding), CA.

PURPOSE: These annual campground conferences promote mathematical exchange in the hinterlands of southern Oregon, northern California, and northwestern Nevada.

INVITED SPEAKERS: D. Meredith, B. Jersky, G. Zhang.

INFORMATION: D. Ellis, Dept. of Math., San Francisco State U., San Francisco, CA 94132; 415-338-1026; e-mail: ellisd@math.sfsu.edu.

15–25. **School of Analysis and Topology**, Katsyvely, Crimea, Ukraine. (Apr. 1993, p. 407)

16–22. **Mathematical Problems in Viscoelastic Flows**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 56)

17–19. **Third International Conference on Expert Systems for Numerical Computing**, Purdue University, West Lafayette, IN. (Dec. 1992, p. 1278)

17–21. **Algebre et Applications**, Marseille, France. (Feb. 1993, p. 180)

18–21. **Eighth Annual Conference on Structure in Complexity Theory**, San Diego, CA. (Oct. 1992, p. 948)

18–21. **Workshop in Function Theory and Algebraic Differential Equations**, University of Illinois, Urbana, IL. (Mar. 1993, p. 277)

20–21. **DIMACS Quadratic Assignment Problem Workshop**, DIMACS Center, Rutgers University, New Brunswick, NJ. (Mar. 1993, p. 277)

20–22. **International Symposium on Ordinary Differential Equations and Applications**, Western Michigan University, Kalamazoo, MI. (Nov. 1992, p. 1117)

20–22. **International Conference on Approximation, Probability, and Related Fields**, University of California, Santa Barbara. (Dec. 1992, p. 1278)

20–23. **International Conference on Approximation Probability and Related Fields**, University of California, Santa Barbara, CA. (May/June 1991, p. 477)

20–23. **Central Section**, Northern Illinois University, DeKalb, IL.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

23–29. **Differentialgeometrie im Grossen**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 56)

24–27. **COMPEURO '93**, Paris-Evry, France. (Jul./Aug. 1992, p. 631)

24–27. **Eurocrypt '93: A Workshop on the Theory and Applications of Cryptographic Techniques**, Lofthus, Norway. (Nov. 1992, p. 1118)

24–28. **Matroides et Matroides Orientes**, CIRM, Marseille, France. (Nov. 1992, p. 1118)

24–28. **Ergodic Theory and Its Connections with Harmonic Analysis**, Alexandria, Egypt. (Feb. 1993, p. 181)

24–28. **Théorie des Nombres et Automates**, CIRM, Marseille, France. (Jan. 1993, p. 57)

24–29. **Second Gokova Geometry/Topology Conference: A Meeting in Low Dimensional Topology**, Gokova, Turkey. (Apr. 1993, p. 408)

26–29. **First International Conference on Dynamic Systems and Applications**, Morehouse College, Atlanta, GA. (Oct. 1992, p. 948)

26–29. **G. J. Butler Workshop in Mathematical Ecology**, Fields Institute for Research in Mathematical Sciences, Waterloo, Ontario. (Mar. 1993, p. 277)

27–28. **Fifteenth Symposium on Mathematical Programming with Data Perturbations**, George Washington University, Washington, DC. (Jan. 1993, p. 57)

28–30. **Algebraic Geometry-Interactions between Commutative Algebra and Algebraic Geometry**, Columbia, MO. (Mar. 1993, p. 277)

30–June 1. **Canadian Society for the History and Philosophy of Mathematics**, Carleton University, Ottawa, Ontario, Canada. (Sep. 1992, p. 772)

30–June 2. **Fourteenth Annual Meeting of the Canadian Applied Mathematics Society/Societe Canadienne de Mathematiques Appliquee**, York University, North York, Ontario. (Jan. 1993, p. 57)

30–June 4. **NSF Calculus Reform Workshop: Core Approach to Calculus**. (Feb. 1993, p. 181)

30–June 5. **Funktionalanalysis und Nicht-lineare Partielle Differentialgleichungen**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 56)

30–June 13. **First Caribbean Spring School of Theoretical Physics and Mathematics on Infinite Dimensional Geometry, Noncommutative Geometry, Operator Algebras, and Particle Physics**, Guadeloupe (French West Indies). (Nov. 1992, p. 1118)

31–June 4. **Workshop on Nonnegative Matrices, Applications, and Generalizations**, Technion, Haifa, Israel. (Nov. 1992, p. 1118)

June 1993

June 1993. **Fourth IMACS International Symposium on Computational Acoustics**, Cambridge, England. (Jan. 1992, p. 56)

June 1993. **GAMM/IFIP - Workshop on Stochastic Optimization: Numerical Methods and Technical Applications**, Neubiberg/München, Germany. (Sep. 1992, p. 773)

June 1993. **Summer Workshop: Calculus, Computers, Concepts, and Cooperative Learning**, Purdue University, West Lafayette, IN. (Nov. 1992, p. 1118)

1–4. **Rigidite et Deformation pour les Systemes Hyperboliques**, CIRM, Marseille, France. (Nov. 1992, p. 1118)

1–5. **CBMS-NSF Conference on Applications of the Representation Theory of Quantum Affine Lie Algebras to Solvable Lattice Models**, North Carolina State University, Raleigh, NC. (Jan. 1993, p. 57)

1–5. **Energy Systems Modeling**, Salisbury State University, Salisbury, MD. (Apr. 1993, p. 408)

* 1–10. **Differential Equations and Their Applications**, Crimea, Ukraine (South Coast, Black Sea).

ORGANIZING COMMITTEE: I. Malyshev (San Jose, CA), V. Sukretny (Kiev, Ukraine).

SCIENTIFIC PROGRAM: Topics will include various aspects of differential equations: ordinary differential equations, partial differential equations, differential equations in Banach spaces, dynamical systems, numerical methods and applications. As the principal part of the program, 18 2-hour

plenary lectures will be offered (2 morning lectures each working day) as well as afternoon seminars given by world-renowned mathematicians.

INFORMATION: V.I. Sukretny, Inst. of Math., Ukr.Ac.Sci., Repin str., 3, Kiev, 252001, Ukraine; Fax: (044) 225-20-10; e-mail: mathem@sovamsu.sovusa.com; or I.G. Malyshev, Dept. of Math. and Comp. Sci., San Jose State U., One Washington Square, San Jose, CA 95192; tel: 408-924-5092; Fax: 408-924-5080; e-mail: malyshev@sjsu.sjsu.edu.

2–4. **The Lars Onsager Symposium. Coupled Transport Processes and Phase Transitions**, Trondheim, Norway. (Dec. 1992, p. 1278)

2–4. **DIMACS Workshop on Parallel Algorithms for Unstructured and Dynamic Problems**, Rutgers University, Piscataway, NJ. (Feb. 1993, p. 181)

2–5. **Ninth Biennial Conference of the Association of Christians in the Mathematical Sciences**, Westmont College, Santa Barbara, CA. (Sep. 1992, p. 773)

3–6. **Symposium on Comparison Methods and Stability Theory**, The Fields Institute, Waterloo, Ontario. (Mar. 1993, p. 278)

3–9. **Fifteenth Nevanlinna Colloquium**, Ann Arbor, MI. (Jan. 1993, p. 57)

4–7. **Sixth Meeting of European Women in Mathematics**, Warsaw, Poland. (Apr. 1993, p. 408)

6–9. **Annual Meeting of the Statistical Society of Canada**, Wolfville, Nova Scotia, Canada. (Feb. 1992, p. 149)

6–12. **Analysis auf Kompakten Varietäten**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 56)

7–10. **SIAM Conference on Mathematical and Numerical Aspects of Wave Propagation Phenomena**, University of Delaware, Newark, DE. (Jul./Aug. 1992, p. 631)

7–10. **The Eighth Haifa Matrix Theory Conference**, Technion, Haifa, Israel. (Nov. 1992, p. 1119)

7–11. **IMA Tutorial: Mathematical Theory which Has become an Integral Part of Modern Financial Economics**, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN. (Nov. 1991, p. 1172)

7–11. **Colloque International en l'Honneur de G. Freiman. La Methode Additive Inverse et ses Applications**, CIRM, Marseille, France. (Nov. 1992, p. 1119)

7–11. **Art and Mathematics Conference (AM93)**, State University of New York, Albany, NY. (Dec. 1992, p. 1279)

7–12. **International Conference in Honour of Bernard Malgrange**, Grenoble, France. (Apr. 1993, p. 409)

7–12. **Methodes Geometriques et Topolo-**

giques en Physique Theorique, Lyon, France. (Jan. 1993, p. 58)

7-12. **Workshop on Pattern Formation and Lattice-Gas Automata**, The Fields Institute, Waterloo, Ontario. (Feb. 1993, p. 182)

7-12. **Seminar on Stochastic Analysis, Random Fields, and Applications**, Ascona, Switzerland. (Feb. 1993, p. 182)

7-13. **Workshop on Pattern Formation and Cellular Automata**, Fields Institute for Research in Mathematical Sciences, Waterloo, Ontario. (Apr. 1992, p. 352)

7-18. **AMS-SIAM Summer Seminar in Applied Mathematics: The Mathematics of Tomography, Impedance Imaging, and Integral Geometry**, Mount Holyoke College, South Hadley, MA.

INFORMATION: D. Salter, AMS, P.O. Box 6887, Providence, RI 02940.

*10-12. **Western Workshop in Geometric Topology**, Corvallis, Oregon and Newport, Oregon.

SUPPORT: This workshop is partially supported by NSF and by Oregon State U. Some travel support for graduate students is available.

ORGANIZERS: D. Garity (Oregon State U.), J. Henderson (Colorado College), F. Tinsley (Colorado College), C. Guilbault (U. of Wisconsin-Milwaukee), F. Ancel (U. of Wisconsin-Milwaukee).

PRINCIPAL SPEAKER: J. Bryant of Florida State U. will be speaking on "Counterexamples to the resolution conjecture".

INFORMATION: D. Garity, Math. Dept., Oregon State U., Corvallis, OR 97331; e-mail: topology@math.orst.edu.

13-18. **The Householder Symposium XII Meeting on Numerical Algebra**, UCLA Conference Center, Lake Arrowhead, CA. (Dec. 1992, p. 1279)

13-18. **NSF Calculus Reform Workshop: Calculus in a Real and Complex World**. (Feb. 1993, p. 182)

13-18. **NSF Calculus Reform Workshop: Ithaca College Program**. (Feb. 1993, p. 182)

13-18. **NSF Calculus Reform Workshop: Harvard Consortium Program**. (Feb. 1993, p. 182)

13-18. **SIMS 1993 AIDS Conference**, Berlin, Germany. (Apr. 1993, p. 409)

13-19. **Differential-Algebraic Equations: Theory and Applications in Technical Simulation**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 56)

14-17. **The Fifth Asian Logic Conference**, National University of Singapore, Singapore. (May/June 1992, p. 496)

14-17. **IMACS Symposium on Symbolic Computation**, Lille, France. (Feb. 1993, p. 182)

14-18. **IMA Workshop on Mathematical**

Finance, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN. (Nov. 1991, p. 1172)

14-18. **Linear Logic Workshop**, Mathematical Sciences Institute, Cornell University, Ithaca, NY. (May/June 1992, p. 496)

14-18. **Homologie des Algebres et Applications**, CIRM, Marseille, France. (Nov. 1992, p. 1119)

14-18. **Geometrical and Topological Methods in Theoretical Physics**, Université Claude Bernard, Lyon 1, France. (Feb. 1993, p. 182)

14-18. **Workshop in Nonlinear Differential Equations**, University of Campinas (UNICAMP), Campinas, Brazil. (Feb. 1993, p. 182)

14-19. **Groups of Lie Type and Their Geometries**, Como, Italy. (Jan. 1993, p. 58)

14-22. **Integrable Systems and Quantum Groups**, Villa La Querceta, Montecatini Terme, Italy. (Feb. 1993, p. 182)

15-17. **IEEE Computer Society Conference on Computer Vision and Pattern Recognition**, Omni Park Central, New York City, NY. (Nov. 1992, p. 1119)

15-17. **Second GAMM/IFIP Workshop on Stochastic Optimization**, München, Federal Republic of Germany. (Jan. 1993, p. 58)

15-17. **Computer Security Foundations Workshop VI**, Franconia, NH. (Jan. 1993, p. 58)

*15-18. **Mathematical Methods in Studying the Structure and Dynamics of Gravitating Systems**, Petrozavodsk (Karelia), Russia.

SCIENTIFIC ORGANIZING COMMITTEE: A. Chermín, S. Kutuzov (Chair), A. Millari, V. Orlov (Secretary), L. Ossipkov, I. Petrovskaya, N. Pitjev (Vice-Chairman).

CONFERENCE TOPICS: Motion in axisymmetric potentials. A third integral; Motion in regular and stochastic fields of gravitating systems; Structure and dynamics of our galaxy; dynamics of groups and clusters of gravitating bodies; structure of a field of objects.

INFORMATION: V. Orlov, Astronomical Institute, St. Petersburg University, Bibliotchnaya pl. 2, 198904 St. Petersburg Sary Peterhof, Russia; Tel: 812-428-41-63; Fax: 812-428-66-49; e-mail: kvk@astro.lgu.spb.su (subject: "for V. Orlov").

16-18. **Third IMACS International Workshop on Qualitative Reasoning and Decision Technologies-QR&DT-3**, Polytechnique of Barcelona, Spain. (Please note date change from Jan. 1992, p. 56)

16-18. **Fifth International Conference on Rewriting Techniques and Applications**, Montreal, Canada. (Jan. 1993, p. 58)

*16-18. **First Annual Meeting of the Palestinian Society of Mathematical Sciences**, Birzeit University, Birzeit, West Bank.

CALL FOR PAPERS: Deadline for papers in all branches of mathematics: May 30, 1993. INFORMATION: M. Awartani, Conference Committee Chair, Department of Mathematics, Birzeit University, Birzeit, West Bank, via Israel; Fax: 972-295-7656.

17-19. **ATLAST 1993 Linear Algebra Workshops**, Michigan State University, East Lansing, MI. (Dec. 1992, p. 1279)

18-19. **Conference on Integration of Pre-calculus with Calculus**, Moravian College, Bethlehem, PA. (Dec. 1992, p. 1279)

20-23. **Eighth Annual IEEE Symposium on Logic in Computer Science (LICS)**, Montreal, Canada. (Nov. 1992, p. 1119)

20-25. **NSF Calculus Reform Workshop: Oregon State Program**. (Feb. 1993, p. 183)

20-26. **Konvexgeometrie**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 56)

20-July 2. **NATO Advanced Study Institute: Real & Complex Dynamical Systems**, Hillerod, Denmark. (Jan. 1993, p. 58)

21-23. **Colloquium on Elementary and Analytic Number Theory**, Lillafüred, Hungary. (Jan. 1993, p. 59)

21-25. **Twenty-second Conference on Stochastic Processes and their Applications**, Amsterdam, The Netherlands. (Sep. 1992, p. 773)

21-25. **Graphs on Surfaces**, Johns Hopkins University, Baltimore, MD. (Sep. 1992, p. 773)

21-25. **Fifth International Conference on Formal Power Series and Algebraic Combinatorics**, University of Florence, Florence, Italy. (Oct. 1992, p. 949)

21-26. **Homogenisation et Methodes de Convergence en Calcul des Variations**, CIRM, Marseille, France. (Nov. 1992, p. 1119)

21-29. **Algebraic Cycles and Hodge Theory**, Villa Gualino, Torino, Italy. (Feb. 1993, p. 183)

*21-July 3. **The Fifth International School for Computer Science Researchers**, Island of Lipari, Italy.

PROGRAM: The topic of the school will be specification and validation methods for programming languages and systems, and it is directed toward Ph.D. students and young researchers who wish to be exposed to the forefront of research activity in this field.

INVITED SPEAKERS: A. Pnueli, Y. Gurevich, K. Apt, M. Fourman, W. Damm, and E. Börger.

INFORMATION: A. Ferro, Dept. of Math., Citta' Universitaria, Viale A. Doria, 6, 95125 Catania, Italy; tel: 39-95-222222/330533 (ext. 663); Fax: 39-95-330094; e-mail: school@mathct.cineca.it.

22-24. **The Twenty-third Annual International Symposium on Fault-Tolerant Computing (FTCS 23)**, Toulouse, France.

(November 1992, p. 1119)

22-25. **Third International Conference on Algebraic Methodology and Software Technology (AMAST '93)**, Enschede, The Netherlands. (Nov. 1992, p. 1119)

22-26. **Cech Birthday Conference**, Northeastern University, Boston, Massachusetts. (January 1993, p. 59)

23. **Symposium on Some Mathematical Questions in Biology: Theories for the Evolution of Haploid-Diploid Life Cycles**, Snowbird, Utah.

INFORMATION: D. Salter, AMS, P.O. Box 6887, Providence, RI 02940.

23-24. **Test Site Workshop**, Harvard University, Cambridge, MA. (Mar. 1993, p. 279)

23-26. **Convergence in Ergodic Theory and Probability**, Ohio State University, Columbus, OH. (May/June 1992, p. 496)

23-27. **Seventeenth Summer Symposium in Real Analysis**, Macalester College, St. Paul, MN. (Jan. 1993, p. 59)

24-26. **Twenty-fifth Anniversary of the Classification Society of North America**, Pittsburgh, PA. (Dec. 1992, p. 1280)

24-26. **ATLAST 1993 Linear Algebra Workshops**, Los Angeles Peirce College, Woodland Hills, CA. (Dec. 1992, p. 1280)

24-26. **Ninth Summer Conference on General Topology and Applications**, Slippery Rock University, Slippery Rock, PA. (Jan. 1993, p. 59)

25-26. **Second Conference on the Teaching of Calculus**, Harvard University, Cambridge, MA. (Mar. 1993, p. 279)

27-July 2. **NSF Calculus Reform Workshop: St. Olaf College Program**. (Feb. 1993, p. 183)

27-July 3. **Algebraische K-Theorie**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

28-30. **Second International Workshop on Logic Programming and Nonmonotonic Reasoning**, Lisbon, Portugal. (Nov. 1992, p. 1120)

28-July 1. **Fifth Conference on Computer-Aided Verification**, Heraklion, Crete, Greece. (Jan. 1993, p. 59)

28-July 2. **Geometrie Algèbre et Théorie des Codes**, CIRM, Marseille, France. (Nov. 1992, p. 1120)

28-July 3. **Conference in Honour of Jean-Pierre Kahane**, University Paris-Sud at Orsay. (Nov. 1992, p. 1120)

28-July 3. **Sixth International Vilnius Conference on Probability Theory and Mathematical Statistics**, Vilnius, Lithuania. (Jan. 1993, p. 59)

*28-July 3. **CBMS Conference on Compensated Compactness, Homogenization, and H-Measures**, University of California at Santa Cruz.

PRINCIPAL SPEAKER: L.C. Tartar.

INFORMATION: Organizer, M.E. Schonbeck, 408-459-4657.

*28-July 9. **The First International Summer School in Logic for Computer Science**, University of Chambéry, Parc Scientifique Savoie-Technolac, Le Bourget-du-lac, France.

PROGRAM: The topic of the school will be proof theory and foundations of programming. The school is primarily intended for young researchers in computer science and mathematics; it is supported by the European Association for Computer Science Logic.

INVITED SPEAKERS: J.-Y. Girard, S. Ronchi, S. Berardi, J.-L. Krivine, D. Leivant, M. Parigot, L. Regnier, A. Scedrov, and J. Tiuryn.

INFORMATION: School Director, M. Parigot/School LCS, Laboratoire de Logique, UFR de Mathématiques, Université Paris, 2, Place Jussieu, 75251 Cedex 05 Paris, France; e-mail: school@logique.jussieu.fr.

28-July 9. **Conference on Matrix Analysis for Applications**, University of Wyoming, Laramie, WY. (Dec. 1992, p. 1280)

29-July 2. **Number Theoretic and Algebraic Methods in Computer Science**, International Center of Scientific and Technical Information (ICSTI), Moscow. (Sep. 1992, p. 773)

July 1993

2-4. **T.I.Tec/K.E.S. Conference on Non-linear and Convex Analysis in Economic Theory**, Tokyo, Japan. (Dec. 1992, p. 1280)

4-9. **Fifth International Fuzzy Systems Association World Congress**, Seoul, Korea. (Mar. 1992, p. 250)

4-10. **Freie Randwertprobleme**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

4-10. **Fifth International Congress on Algebraic Hyperstructures and Applications**, Iasi, Romania. (Sep. 1992, p. 773)

4-10. **Methoden der Modul- und Ringtheorie**, Oberwolfach, Federal Republic of Germany. (Jan. 1993, p. 59)

4-16. **Probability Theory of Spatial Disorder and Phase Transition**, Isaac Newton Institute, University of Cambridge, England. (Feb. 1993, p. 183)

5-9. **Communications et Réseaux d'Interconnexion**, CIRM, Marseille, France. (Nov. 1992, p. 1120)

*5-9. **The Thirty-seventh Annual Meeting of the Australian Mathematical Society (AMS '93)**, University of Wollongong, Australia. (Please note additional information to Nov. 1992, p. 1120)

INVITED SPEAKERS: Please add J. Alperin (U. of Chicago) to the previous list.

CALL FOR PAPERS: Participants are invited to present papers of 25-minutes duration on any area of mathematics. Students are reminded that they may compete for the B.H. Neumann prize which is awarded for the best student talk at the conference. Students who present papers are also eligible for up to \$100 assistance with their travel and accommodation expenses.

5-9. **CTAC93 Conference and Workshops**, Australian National University, Canberra, A.C.T., Australia. (Dec. 1992, p. 1280)

5-9. **British Combinatorial Conference**, Keele University, Staffordshire, UK. (Dec. 1992, p. 1281)

5-10. **Summer School on Nonlinear Dynamics and Pattern Formation**, Santiago de Compostela, Spain. (Mar. 1993, p. 280)

5-31. **NSF Regional Geometry Institute: Discrete Geometry**, Smith College, Northampton, MA. (Nov. 1992, p. 1120)

6-9. **European Multigrid Conference '93**, Amsterdam, The Netherlands. (May/June 1992, p. 496)

6-23. **IMA Summer Program on Modeling, Mesh Generations, and Adaptive Numerical Methods for Partial Differential Equations**, University of Minnesota, Minneapolis, MN. (Nov. 1992, p. 1120)

7-9. **Fourth IMACS International Conference on Computational Aspects of Electromechanical Energy Converters and Drives-IMACS-TC1 '93**, Ecole Polytechnique de Montreal, Canada. (Feb. 1993, p. 183)

7-10. **The Second International Conference on Fluid Mechanics (ICFM-II)**, Beijing, China. (Sep. 1992, p. 773)

8-10. **ATLAST 1993 Linear Algebra Workshops**, University of Houston-Downtown, Houston, TX. (Dec. 1992, p. 1281)

8-10. **Symposium on Inverse Problems and Optimal Design in Industry**, Philadelphia, PA. (Mar. 1993, p. 280)

9-11. **1993 Annual Meeting of the Australasian Association for Logic**, University of Adelaide, South Australia.

10-August 6. **Joint Summer Research Conferences in the Mathematical Sciences**, University of Washington, Seattle, WA.

INFORMATION: C. Kohanski, AMS, P.O. Box 6887, Providence, RI 02940.

*11. **Tutorial: Introduction to Wavelets and Applications**, Philadelphia, PA.

ORGANIZER: C.K. Chui, Texas A&M U.
INFORMATION: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; 215-382-9800; Fax: 215-386-7999; meetings@siam.org.

* 11. **Tutorial: Introduction to Continuous Time Finance**, Philadelphia, PA.

ORGANIZER: J.-L. Vila, MIT.

INFORMATION: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; 215-382-9800; Fax: 215-386-7999; meetings@siam.org.

11–15. **Second World Congress on Neural Networks (WCNN '93)**, Portland, OR. (Mar. 1993, p. 280)

11–17. **Nonlinear Evolution Equations, Solutions and the Inverse Scattering Transform**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

11–30. **Summer Research Institute on Stochastic Analysis**, Cornell University, Ithaca, NY.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

12–16. **SIAM Annual Meeting**, Philadelphia, PA. (Mar. 1993, p. 281)

12–16. **Chaotic Numerics (An International Workshop on the Approximation and Computation of Complicated Dynamical Behavior)**, Deakin University, Geelong, Australia. (Oct. 1992, p. 949)

12–16. **Workshop on Algebraic Graph Theory**, International Centre for Mathematical Sciences, Edinburgh, Scotland. (Mar. 1993, p. 281)

* 12–16. **Nineteenth Australasian Conference on Combinatorial Mathematics and Combinatorial Computing**, The University of Adelaide, South Australia.

ORGANIZING COMMITTEE: C.M. O'Keefe, L.R.A. Casse, R.J. Clarke, L. Cousins (U. of Adelaide).

INVITED SPEAKERS: C. Berge, Paris; W. Cherowitzo, Colorado; D. Foata, Strasbourg; D. Hoffman, Auburn; R. Lidl, Tasmania; T. Pentilla, Western Australia; M. de Resmini, Rome; J. Thas, Ghent.

CALL FOR PAPERS: Deadline for Abstracts: July 1, 1993.

INFORMATION: C.J. O'Keefe, Dept. of Pure Math., The University of Adelaide, GPO Box 498, Adelaide, SA 5001, Australia; e-mail: cokeefe@maths.adelaide.edu.au.

12–17. **Colloque Takeuti: Theorie de la Demonstration et Applications en Informatique**, CIRM, Marseille, France. (Nov. 1992, p. 1121)

12–17. **Third International Conference on Nonassociative Algebra and its Applications**, University of Oviedo, Spain. (November 1992, p. 1121)

12–23. **Conference on Universal Algebra and Category Theory**, Mathematical Sciences Research Institute (MSRI), Berkeley, CA.

(May/June 1992, p. 496)

13–21. **Modeling and Analysis of Phase Transitions and Hysteresis Phenomena**, Villa La Querceta, Montecatini Terme, Italy. (Feb. 1993, p. 184)

15–17. **ATLAST 1993 Linear Algebra Workshops**, Georgia State University, Atlanta, GA. (Dec. 1992, p. 1281)

18–23. **NSF Calculus Reform Workshop: Project Calc.** (Feb. 1993, p. 184)

18–23. **NSF Calculus Reform Workshop: Iowa State University Program.** (Feb. 1993, p. 184)

18–24. **Dynamische Systeme**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

18–24. **Twelfth International Conference on Near-rings and Near-fields**, University of New Brunswick, Fredericton, N.B., Canada. (Dec. 1992, p. 1281)

18–24. **International Conference on Combinatorics**, Keszthely, Hungary. (Jan. 1993, p. 60)

19–23. **Singularities**, CIRM, Marseille, France. (Nov. 1992, p. 1121)

19–23. **International Congress on Computer Systems and Applied Mathematics**, St. Petersburg, Russia. (Dec. 1992, p. 1282)

19–23. **Seventh ACM International Conference on Supercomputing**, Tokyo, Japan. (Jan. 1993, p. 60)

19–24. **The Arithmetic of Elliptic Curves**, Anogia, Crete, Greece. (Jan. 1993, p. 60)

19–August 13. **CRM Summer School on Mathematical Biology**, University of British Columbia. (Jan. 1993, p. 60)

* 20–29. **1993 ASL European Summer Meeting (Logic Colloquium '93)**, University of Keele, United Kingdom. (Please note additional information to Nov. 1992, p. 1121)

INVITED SPEAKERS: A. Blass, M. Gitik, U. Kohlenback, D. Lascar, D. Marker, J. Ohlbach, E. Rabinovich, R. Staerk, M. van Lambalgen, A. Wilkie, B. Zilber.

INFORMATION: Program Chair, W. Hodges, School of Math. Sciences, Queen Mary and Westfield College, Mile End Rd., London E1 4AS, UK; e-mail: w.hodges@qmw.ac.uk; Fax: 081-981 9587.

21–23. **Second International Symposium on High Performance Distributed Computing (HPDC-2)**, Spokane, WA. (Jan. 1993, p. 60)

22–24. **ATLAST 1993 Linear Algebra Workshops**, University of Maryland, College Park, MD. (Dec. 1992, p. 1282)

23–24. **The Fourth Annual Conference on Technology**, Houston, TX. (Mar. 1993, p. 281)

25–30. **International Workshop on Differential Geometry and its Applications**, Bucharest, Romania. (Mar. 1993, p. 281)

25–31. **Geometric Methods in Theoretical**

and Computational Mechanics, Oberwolfach, Fed. Rep. of Germany. (Jan. 1992, p. 57)

26–30. **NATO Advanced Research Workshop: Classical and Axiomatic Potential Theory**, Les Arcs, Savoy, France. (Oct. 1992, p. 950)

26–30. **Groupes Ordonnes et Groupes de Permutations Infinis**, Marseille, France. (Jan. 1993, p. 60)

26–30. **Cryptography and Computational Number Theory**, North Dakota State University, Fargo, ND. (Jan. 1993, p. 60)

26–30. **ICASE/LaRC Short Course on Parallel Computation**, Hampton, VA. (Mar. 1993, p. 281)

26–August 6. **SMS-NATO ASI: Complex Potential Theory**, Université de Montréal, Montréal, Canada. (Dec. 1992, p. 1282)

27–30. **Seventh Workshop on Operator Theory and Boundary Eigenvalue Problems**, Vienna Technical University, Vienna, Austria. (Jan. 1993, p. 60)

31–August 1. **Conference on Logic and Linguistics**, Ohio State University. (Jan. 1993, p. 61)

31–August 6. **Joint Summer Research Conferences in the Mathematical Sciences**, University of Washington, Seattle, WA. (Mar. 1993, p. 282)

August 1993

August–December. **A Semester at CRM: Spatial and Temporal Dynamics**, Université de Montréal. (Jan. 1993, p. 61)

August 1993. **International Conference on New Trends in Computer Science I (NET-COMS I)**, University of Ibadan, Nigeria. (Nov. 1992, p. 1121)

1–7. **Abelsche Gruppen**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

1–14. **Groups 93 Galway/St. Andrews**, Galway, Ireland. (Nov. 1992, p. 1121)

* 2–4. **Advances in Geometric Analysis and Continuum Mechanics**, Stanford University, Stanford, CA.

PROGRAM: An international conference on the occasion of the 70th birthday of Robert Finn.

ORGANIZING COMMITTEE: H. Beckert, U. of Leipzig; P. Concus, U. of California; J. Heywood, U. of British Columbia; K. Lancaster, Wichita State U.; L.F. Tam, U. of California; J. Taylor, Rutgers U.

CONFERENCE TOPICS: Talks presented at the conference are intended to cover advances in areas to which Robert Finn has made major contributions, ranging from compressible fluid flows to Navier-Stokes equations, differential geometry, nonlinear partial differential equations, and capillary surfaces.

INFORMATION: P. Concus, LBL 50A-2129, U. of California, Berkeley, CA 94720; e-mail: concus@math.berkeley.edu.

2-6. **Second Gauss Symposium**, Munich, Germany. (Dec. 1992, p. 1282)

2-6. **International Symposium on the Mathematical Theory of Networks and Systems**, Regensburg, Germany. (Sep. 1992, p. 774)

*2-6. **CBMS Conference on Equivariant Homotopy and Cohomology**, University of Alaska at Fairbanks.

PRINCIPAL SPEAKER: J. Peter May.

INFORMATION: Organizer, R.J. Piacenza, 907-474-7772, e-mail: ffrjp@alaska.bitnet.

2-13. **Georgia International Topology Conference**, University of Georgia, Athens, GA. (Jan. 1993, p. 61)

*3-5. **The 8th KAIST Mathematics Workshop**, Korea Advanced Institute of Science and Technology, Taejon, Korea. (Please note additional information to Apr. 1993, p. 411)

INVITED SPEAKERS: G.J. Fix, R.E. Ewing, W.-Y. Hsiang, R.E. Greene (tentative).

4-6. **SIAM Conference on Simulation and Monte Carlo Methods**, San Francisco, CA. (Dec. 1992, p. 12822)

4-8. **Summer School in Mathematical Quantum Theory**, University of British Columbia, Vancouver, B.C. (Feb. 1993, p. 184)

5-9. **Fifth Canadian Conference on Computational Geometry**, University of Waterloo, Waterloo, Ontario, Canada. (Apr. 1993, p. 411)

*6-7. **Symposium on Modern Interdisciplinary University Statistics Education**, San Francisco, CA.

PROGRAM: This symposium will focus on the changes needed in statistics education to 1) incorporate cross-disciplinary training into upper-undergraduate, graduate, and postdoctoral programs; 2) bring the graduate curriculum up to date; and 3) improve apprentice programs for graduate and postdoctoral students and reward faculty mentors for such activity.

INVITED SPEAKERS: J. Kettenring (Bellcore), P. Bickel (U. of California, Berkeley), P. Ross (Environmental Protection Agency), J. Bailar, III (McGill U.), J. Lehoczky (Carnegie Mellon U.), J. Garfield (U. of Minnesota), E. Rothman (U. of Michigan), J. Laurie Snell (Dartmouth College), P. Goel (Ohio State U.), S. Fienberg (York U.).

INFORMATION: J. Tucker, Program Officer for CATS, Board on Mathematical Sciences, National Research Council, NAS 312, 2101 Constitution Ave., NW, Washington, DC 20418; tel: 202-334-2421; Fax: 202-334-1597; internet: bms@nas.edu; bitnet: bms@nas.bitnet.

6-19. **Stochastic Analysis and Applications in Physics**, NATO Advanced Study Institute at the Universidade da Madeira. (Jan. 1993, p. 61)

7-21. **Semigroups and their Applications**, York, England. (Sep. 1992, p. 774)

8-11. **Workshop on Hierarchical Test Generation**, Virginia Polytechnic Institute and State University, Blacksburg, VA. (Mar. 1993, p. 282)

8-14. **Konstruktive Approximationstheorie**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

9-12. **Joint Statistical Meetings**, San Francisco, CA. (Nov. 1991, p. 1172)

9-13. **Sixth International Conference on Structural Safety and Reliability (ICOSSAR '93)**, Innsbruck, Austria. (Sep. 1992, p. 774)

9-13. **Analysis Colloquium**, Szeged, Hungary. (Jan. 1993, p. 61)

9-13. **Symposium on Mathematics of Computation 1943-1993: A Half-century of Computational Mathematics**, University of British Columbia, Vancouver, Canada.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

9-14. **Analysis of Dynamical and Cognitive Systems**, Huddinge (Stockholm). (Mar. 1993, p. 282)

10-14. **Summer School in Mathematical Quantum Theory**, University of British Columbia, Vancouver, B.C. (Feb. 1993, p. 185)

13-17. **Second International Colloquium on Numerical Analysis**, Plovdiv, Bulgaria. (Dec. 1991, p. 1341)

14-17. **First Workshop on Oscillation Theory**, Plovdiv, Bulgaria. (Oct. 1992, p. 950)

15. **Tutorial on Numerical Methods in Control, Signal, and Image Processing**, University of Washington, Seattle, WA. (Jan. 1993, p. 61)

15-19. **Joint Mathematics Meetings**, University of British Columbia, Vancouver, British Columbia (including the summer meetings of the AMS, AWM, CMS, MAA, and PME).

INFORMATION: H. Daly, AMS, P.O. Box 6887, Providence, RI 02940.

15-21. **Noncommutative Algebra and Representation Theory**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

15-27. **XI Latin American School of Mathematics (ELAM)**, Mexico. (Nov. 1992, p. 1121)

16-17. **Fourth Stockholm Optimization Days**, Royal Institute of Technology, Stockholm, Sweden. (Apr. 1993, p. 412)

16-19. **Third SIAM Conference on Linear Algebra in Signals, Systems, and Control**, University of Washington, Seattle, WA. (Dec. 1992, p. 1283)

16-20. **First European Nonlinear Oscilla-**

tions Conference, Hamburg, Germany. (Sep. 1992, p. 774)

16-20. **Conference on Variational Problems in Differential Geometry and Partial Differential Equations**, Trieste, Italy. (Jan. 1993, p. 61)

16-20. **Twenty-second Annual Conference: 1993 International Conference on Parallel Processing**, The Pennsylvania State University, University Park, PA. (Jan. 1993, p. 61)

17-20. **The Mathematical Heritage of Sir William Rowan Hamilton**, Dublin, Ireland. (May/June 1992, p. 497)

17-20. **International Symposium on Statistics with Non-precise Data**, Innsbruck, Austria. (Sep. 1992, p. 774)

17-21. **Second International Conference on Finite Fields: Theory, Applications, and Algorithms**, University of Nevada, Las Vegas. (Sep. 1992, p. 774)

18-22. **Fourth International Colloquium on Differential Equations**, Plovdiv, Bulgaria. (Dec. 1991, p. 1341)

18-September 4. **Twenty-third Ecole d'Ete de Calcul des Probabilites**, Saint-Flour (Cantal). (Mar. 1993, p. 283)

22-26. **Crypto '93**, University of California, Santa Barbara. (Jan. 1993, p. 61)

22-27. **Colloquium on Topology**, Lillafured, Hungary. (Jan. 1993, p. 62)

22-28. **Special Complex Varieties**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

22-28. **Thirty-first International Symposium on Functional Equations**, L. Kossuth University, Debrecen, Hungary. (Apr. 1993, p. 412)

22-29. **Twenty-ninth International Congress of History of Science**, Zaragoza, Spain. (Apr. 1992, p. 352)

23-27. **Lattices, Ordered Sets, and Universal Algebra (Sixteenth Algebraic Conference in Szeged)**, Szeged, Hungary. (Jan. 1993, p. 62)

23-28. **International Conference on Algebra Dedicated to the Memory of M.I. Kargapolov**, Krasnoyarsk, Russia. (Jul./Aug. 1992, p. 632)

23-September 4. **NATO Advanced Study Institute on Polytopes: Abstract, Convex, and Computational**, Scarborough, Ontario, Canada. (Dec. 1992, p. 1283)

24-27. **Third Kurt Gödel Colloquium**, Brno, Czech Republic. (Jan. 1993, p. 62)

24-28. **Equadiff 8**, Bratislava, Czechoslovakia. (Dec. 1992, p. 1283)

*24-28. **CBMS Conference on Classification of Amenable Subfactors and Related Topics**, University of Oregon, Eugene, OR.

PROGRAM: S.T. Popa, UCLA (the principal speaker) will give a series of ten one-hour lectures. In addition about 10 other people

will give one-hour talks on related topics. As with all NSF-CBMS conferences, both established researchers and interested newcomers, including postdoctoral fellows and graduate students, are invited to attend.

INFORMATION: Organizer, N.C. Phillips, Dept. of Math., University of Oregon, Eugene, OR 97403-1222; tel: 503-346-4714, e-mail: phillips@bright.uoregon.edu.

25–September 3. **Forty-ninth Biennial Session of the International Statistical Institute**, Firenze, Italy. (Nov. 1991, p. 1172)

29–30. **Conference on Rings, Extensions, and Cohomology on the Occasion of the Retirement of Daniel Zelinsky**, Northwestern University, Evanston, IL. (Dec. 1992, p. 1283)

29–September 4. **Random Graphs and Combinatorial Structures**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

* 30–September 1. **International Symposium on Nonlinear Dynamics and Stochastic Mechanics**, Fields Institute, Waterloo, Ontario.

ORGANIZERS: W.F. Langford, N. Sri Namachchivaya, and W.H. Kliemann.

SCOPE AND GOALS: The development of nonlinear mechanics has been and is clearly connected with several areas in applied mathematics, such as ordinary, partial, and delay differential equations, dynamical systems, functional analysis, and, more recently, the theory of stochastic processes. At the same time, problems in nonlinear mechanics have contributed to the developments in, for example, Lyapunov theory, invariant manifolds, ergodic theory, bifurcation theory, and stochastic stability. In recent years important progress has been made in areas of applied mathematics such as normal forms, chaos theory, bifurcation theory, stochastic flows, Lyapunov exponents, large deviations, etc. These arrangements, in turn, lead to a better understanding of nonlinear phenomena. To a certain extent, these new ideas, approaches, and results are being used in nonlinear mechanics to tackle such problems as stability of aircraft at high angles of attack, stability and global bifurcations in plates and shells, mixing and transport phenomena in fluid mechanics, and nonlinear analysis of rotating systems.

INVITED SPEAKERS: L. Arnold, U. of Bremen; A. Bajaj, Purdue U.; V.V. Bolotin, USSR Academy of Sciences; T.K. Caughey, Caltech; S.H. Crandall, MIT; M.F. Dimentberg, Worcester Polytechnic Inst.; S. Hsu, U. of California, Berkeley; W.F. Langford, Fields Inst./U. of Guelph; Y.K. Lin, Florida Atlantic U.; J. Marsden, Fields Inst./U. of California, Berkeley; M. Pinsky, Northwestern U.; E. Platen, The Australian Nat'l U., Canberra; A.H. Nayfeh, Virginia Polytechnic and State U.; R. Seydel, U. of Ulm, Germany; S.W. Shaw, U. of Michi-

gan; H. Troger, Technical U. of Vienna; W. Wedig, U. of Karlsruhe; S. Wiggins, Fields Inst./Caltech; V. Wishtutz, U. of North Carolina.

INFORMATION: Workshop Information: N. Sri Namachchivaya, 519-725-0096, ext. 3043; namachch@fields.uwaterloo.ca. For Registration Information: J. Motts, 519-725-0096, ext. 3003; motts@fields.uwaterloo.ca.

30–September 3. **Inverse Problems: Principles and Applications in Geophysics, Technology, and Medicine**, Potsdam (near Berlin), Germany. (Sep. 1992, p. 774)

30–September 3. **Représentations des Groupes et Analyse Complexe**, CIRM, Marseille, France. (Nov. 1992, p. 1121)

30–September 3. **Eleventh International Conference on the New Quality Philosophy in Statistical Research and Education**, Firenze, Italy. (Jan. 1993, p. 62)

30–September 3. **Conference on the Finite Element Method: Fifty Years of the Courant Element**, Jyväskylä, Finland. (Apr. 1993, p. 412)

30–September 3. **International Workshop on Validated Computation**, University of Oldenburg, Germany. (Feb. 1993, p. 185)

30–September 3. **Second International Conference on Parallel Computing Technologies (PaCT-93)**, Obninsk, Russia. (Apr. 1993, p. 412)

September 1993

* 1–9. **Mathematical Society of Japan International Research Institute on the Topology of the Moduli Space of Curves**, Kyoto, Japan.

PROGRAM: Two and one-half hour main lectures (with intermission) in the morning; one-hour talks in the afternoon.

ORGANIZERS: E. Arbarello (Rome), T. Miwa (Kyoto), T. Shiota (Kyoto).

INVITED SPEAKERS: C.-F. Boedigheimer, R. Hain, J. Harer, C. Itzykson, N.V. Ivanov, M. Kontsevich, E.J.N. Looijenga, S. Morita, S. Nag, Takayuki Oda, R. Penner, N.J. Reshetikhin, A.K. Raina, T.R. Ramadas, K. Saito.

INFORMATION: N. Tanaka, Dept. of Math., Kyoto Univ., Kyoto 606-01, Japan; e-mail: juten@kum.kyoto-u.ac.jp; Fax: (81)75-753-3707.

* 2–5. **French-Norwegian Symposium on Computer-Aided Mathematics in Education and Industry**, Gran, Norway.

SYMPOSIUM THEME: 1) The potential of computer-aided mathematics and interactive teaching software in mathematics education. Experiences and perspectives. 2) How is computer-aided mathematics used

in industry? What should be done in mathematics education to prepare the students for that way of working? [In the context of the symposium, **computer-aided mathematics** refers mainly to the use of symbolic computing languages like *Mathematica*, *Maple*, etc. **Education** refers to first- and second-year university education for science and engineering students.]

PROGRAM: The program will consist of invited lectures by internationally known experts in computer-aided mathematics (from the teaching and from the industrial viewpoint). Ample time will be allocated to computer exercises, discussions, and demonstrations.

INVITED SPEAKERS AND TOPICS: G. Lassalle-Balier (Toulouse), The use of computer algebra in industry; B. Beauzamy (Paris), Symbolic computation: a scientific and social challenge for mathematicians; R. Durand (Toulouse), Math calculus and *Mathematica* in the teaching of mathematics to first- and second-year engineering students at INSAT, Toulouse; L.E. Lund (NTH, Trondheim), Computer-aided learning for numerical mathematics; K. Rijpkema (Eindhoven), Title not yet decided; L. Raade (Gothenburg), (a) Teaching of mathematics in the computer age, and the SEFI mathematics working group; (b) How computer algebra changed my life; W. Schaufelberger (Zürich, Switzerland), Title not yet decided; A. Warusfel (France), Using symbolic software at the undergraduate and at the graduate levels.

INFORMATION: H. Barthet, Complexe Scientifique de Rangueil, 31077 Toulouse Cedex; Fax: (33)-61-55-95-77; or B. Birkenland, Inst. of Math., P.B. 1053, Blindern, N-0316 Oslo, Norway; Fax: (47)-22-85-43-49; e-mail: bentb@math.uio.no.

5–11. **Novikov Conjectures, Index Theorems and Rigidity**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

5–11. **Nonlinear Numerical Methods and Rational Approximation**, University of Antwerp, Belgium. (Oct. 1992, p. 950)

5–12. **First World Conference on Branching Processes**, Varna, Bulgaria. (Jan. 1993, p. 62)

6–8. **Bi-National France-Israel Symposium: The Brownian Sheet—New Results and Developments**, Bar-Ilan University (Israel). (Feb. 1993, p. 185)

6–10. **Lattice Points in Polyhedra and Applications in Geometry and Topology**, CIRM, Marseille, France. (Please note name change from Mar. 1993, p. 283)

6–11. **Eleventh International Conference on Topology**, Trieste, Italy. (Jan. 1993, p. 62)

* 7–12. **Algebras in Analysis**, Kent State University, Kent, OH.

PROGRAM: This conference will focus on

operator theory, measure theory, and non-linear functional analysis. A highlight will be an expanded two-day *Informal Analysis Seminar*. There is a possibility of some very limited financial support for participants.
ORGANIZERS: R.M. Aron, J. Diestel, P. Enflo, V. Lomonosov, A. Tonge.
INFORMATION: Algebras in Analysis, Department of Mathematics, Kent State University, Kent, OH 44242; e-mail: sommers@mcs.kent.edu.

9-15. **IMA Tutorial**, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN. (Jan. 1993, p. 62)

12-16. **Third Dublin Differential Equations Meeting**, Dublin City University, Dublin, Ireland. (Jan. 1993, p. 62)

12-18. **Topologie**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

13-17. **Fourth European Software Engineering Conference**, Garmisch, Germany. (Jul./Aug. 1992, p. 632)

13-17. **Tenth Conference on Problems and Methods in Mathematical Physics (10. TMP)**, Chemnitz, Federal Republic of Germany. (Feb. 1993, p. 186)

13-17. **Logique de la Connaissance et Théorie de la Décision**, Marseille, France. (Feb. 1993, p. 186)

13-18. **Different Aspects of Differentiability**, Warsaw, Poland. (May/June 1992, p. 497)

14-17. **Mathematical Modelling and Scientific Computation (MMS-93)**, Sozopol, Bulgaria. (Mar. 1993, p. 283)

17-20. **Technology in Mathematics Teaching (TMT '93): A Bridge between Teaching and Learning**, The University of Birmingham, England. (Dec. 1992, p. 1283)

18-19. **Eastern Section**, Syracuse University, Syracuse, NY.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

19-25. **Mathematical Game Theory**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

20-24. **Methodes Numeriques dans la Theorie des Surfaces de Riemann**, CIRM, Marseille, France. (Nov. 1992, p. 1122)

20-24. **Thirteenth Congress of the Austrian Mathematical Society**, Linz, Austria. (Dec. 1992, p. 1284)

20-24. **IMA Workshop on Probability and Algorithms**, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN. (Jan. 1993, p. 63)

20-24. **Ordinary Differential Equations and Their Applications**, Firenze, Italy. (Feb. 1993, p. 186)

20-25. **International Conference on Number Theory**, Tula State Pedagogical Institute, Tula, Russia. (Mar. 1993, p. 284)

20-26. **Seventh Symposium on Classical Analysis**, Kazimierz Dolny, Poland. (Dec. 1992, p. 1284)

20-October 1. **Second Workshop on Composite Media and Homogenization**, International Centre for Theoretical Physics, Trieste, Italy. (Apr. 1993, p. 413)

21-24. **Sixth International Workshop on Stochastic Geometry, Stereology, and Image Analysis in honor of L.A. Santalo**, Valencia, Spain. (Mar. 1993, p. 284)

26-29. **SCAN-93 IMACS/GAMM International Symposium on Scientific Computation, Computer Arithmetic, Validated Numerics**, Technical University of Vienna, Austria. (Apr. 1993, p. 413)

*26-October 1. **Second International Conference on Approximation and Optimization**, Havana, Cuba.

SPONSORS: International Mathematical Union and the Third World Academy of Sciences.

PROGRAM: Approximation, optimization, numerical methods for nonlinear equations and optimization, comprehensive applications. Refereed proceedings will be published in the series "Approximation and Optimization", Peter Lang Verlag, Berlin, New York, Paris.

INFORMATION: J. Guddat, FB Mathematik, Humboldt Universität, PSF 1297, D-O-1086, Berlin, Germany; tel: +(30)2993-2268/2353; fax: +(30)2093-2238; e-mail: guddat@mathematik.hu-berlin.dbp.de.

26-October 2. **Diophantische Approximationen**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

27-28. **Workshop on Large Eddy Simulation in Aerodynamics and the Environment**, Université de Montréal. (Jan. 1993, p. 63)

27-October 1. **Orbites Périodiques des Systèmes Dynamiques**, CIRM, Marseille, France. (Jan. 1993, p. 63)

27-October 1. **Fourth Conference on Discrete Mathematics**, University of Potsdam, Germany. (Mar. 1993, p. 284)

28-October 1. **CIRM Workshop on Algebraic Vector Bundles and Applications**, Trento, Italy. (Apr. 1993, p. 413)

*28-October 2. **Second Conference on Non-linear Problems of Differential Equations and Mathematical Physics**, Kiev, Ukraine.

PROGRAM: The scientific program will cover results in constructive and qualitative methods in nonlinear differential equations and partial differential equations, asymptotic behavior of solutions, stability theory, dynamical systems, and their applications. Presentations will consist of one-hour lectures and 20-minute talks.

INFORMATION: V. Koloniets, Institute of Mathematics, 3 Repin Str., Kiev, Ukraine;

e-mail: mathem@sovamsu.sovusa.comm;
 Fax: (7-044) 225-2010.

October 1993

1-3. **Joint Meeting with the Deutsche Mathematiker-Vereinigung e.V.**, University of Heidelberg, Heidelberg, Germany.

INFORMATION: H. Daly, AMS, P.O. Box 6887, Providence, RI 02940.

3-9. **Arbeitsgemeinschaft mit Aktuellem Thema**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

*4-6. **Second International Conference of the ACPC (Austrian Center for Parallel Computation)**, Gmunden (near Salzburg), Austria. (Mar. 1993, p. 284)

*4-6. **Workshop on Continuous Algorithms and Complexity**, Universitat Autònoma de Barcelona, Bellaterra, Barcelona, Spain.

PROGRAM: The workshop is part of the semester in Continuous Algorithms and Complexity that will take place in Barcelona in the fall of 1993, and intends to bring together researchers from traditionally different areas of math and computer science who use continuous algorithms.

CONFERENCE TOPICS: Algebraic complexity, algebraic algorithms, information-based complexity, lower bounds and optimal algorithms, models for continuous computations, polynomial equation solving, quantifier elimination, structure of complexity classes over the reals.

INVITED SPEAKERS: P. Fraigniaud, Lyon; M. Karpinski, Bonn; T.-Y. Li, Michigan; T. Lickteig, Bonn; K. Meer, Aachen; C. Michaux, Mons; M. Shub, IBM; S. Smale, Berkeley.

CONTRIBUTED TALKS: These can be freely presented at the workshop and are encouraged. An abstract of no more than two pages is required. Deadline for submission of abstracts: September 1, 1993.

INFORMATION: F. Cucker, Universitat Pompeu Fabra, c/Balmes 132, Barcelona 08008, Spain; e-mail: cucker@upf.es; or C. Roca, Centre de Recerca Matemàtica, Apartat 50, Bellaterra 08193, Spain; e-mail: icrmo@cc.uab.es.

6-8. **Games, Logic, and Process**, CIRM, Marseille, France. (Jan. 1993, p. 63)

6-9. **Second IMACS International Conference on Computational Physics**, Parks College of St. Louis University, Cahokia, Illinois. (Feb. 1993, p. 186)

*8-9. **Twenty-first Annual Mathematics and Statistics Conference on the Teaching and Learning of Undergraduate Mathematics**, Miami University, Oxford, OH.

PRINCIPAL SPEAKERS: J. Schwartz, Har-

vard U.; K. Geuther Graham, U. of New Hampshire; D. Smith, Duke U.

CALL FOR PAPERS: Abstracts for contributed papers should be sent by June 21, 1993, to the address below.

INFORMATION: Conference programs with information concerning preregistration and housing will be available after July 15, 1993, from J.H. Skillings, Chair, Dept. of Math. and Stats., Miami Univ., Oxford, OH 45056-1641; 513-529-5818.

10-16. **Invariant Ordering in Geometry and Algebra**, Oberwolfach, Federal Republic of Germany. (Feb. 1993, p. 186)

10-16. **Adaptive Methoden für Partielle Differentialgleichungen**, Oberwolfach, Federal Republic of Germany. (Feb. 1993, p. 186)

11-14. **Gestion de Projets Statistiques**, CIRM, Marseille, France. (Jan. 1993, p. 63)

14-20. **Wavelets: Theory, Algorithms, and Applications**, Taormina, Sicily, Italy. (Apr. 1993, p. 413)

* 15-16. **Thirteenth Meeting of the Southeastern-Atlantic Regional Conference on Differential Equations**, University of North Carolina at Wilmington, Wilmington, NC. (Please note corrected names of invited speakers to Mar. 1993, p. 284)

INVITED SPEAKERS: H.T. Banks (N.C. State), J.T. Beale (Duke U.), I. Stakgold (U. of Delaware).

* 15-16. **Fifteenth Midwest Probability Colloquium**, Evanston, IL.

INVITED SPEAKERS: F. Ledrappier (2 talks), R. Carmona, and Y. Peres.

INFORMATION: M. Pinsky, Dept. of Math., Northwestern Univ., Evanston, IL 60208; e-mail: m.pinsky@math.nwu.edu.

15-17. **Second International Conference on Ordinal Data Analysis**, University of Massachusetts, Amherst, MA. (Mar. 1993, p. 284)

17-23. **Geometrie**, Oberwolfach, Federal Republic of Germany. (Jan. 1992, p. 57)

18-20. **Workshop on Coding, System Theory, and Symbolic Dynamics**, Boston area. (Apr. 1993, p. 414)

18-22. **IMA Workshop on Finite Markov Chain Renaissance**, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN. (Jan. 1993, p. 63)

19-22. **1993 International Conference on Network Protocols (ICNP-93)**, San Francisco, CA. (Jan. 1993, p. 63)

20-22. **Stage de Bibliothécaires de Mathématiques**, CIRM, Marseille, France. (Jan. 1993, p. 63)

* 20-22. **1993 IEEE Workshop on VLSI Signal Processing**, Koningshof, Veldhoven, The Netherlands.

PROGRAM: The objective of this workshop

is to provide a forum for discussion of new theoretical and applied developments in signal processing in its relation to implementation as Very Large Scale Integrated Circuits. The keynote address and one panel session will focus on industrial and technical challenges in signal processing for consumer applications. The aim is to have also one session devoted to this topic. A hard-bound record of the workshop will be published.

CALL FOR PAPERS: Papers are solicited that relate to the technologies involved in the design and implementation of signal processing algorithms and systems as VLSI circuits.

INFORMATION: M. Emmers/M. van Kessel, Philips International B.V./CPDC, Building VO-p, P.O. Box 218, 5600 MD Eindhoven, The Netherlands.

22-23. **Central Section**, Texas A&M University, College Station, Texas.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

24-27. **Functional Analysis on the Eve of the Twenty-First Century, in Honor of the Eightieth Birthday of Israel M. Gelfand**, Rutgers University, New Brunswick, NJ. (Apr. 1993, p. 414)

24-30. **Mengenlehre**, Oberwolfach, Federal Republic of Germany. (Feb. 1993, p. 186)

* 25-26. **Visualization '93 Symposia**, San Jose, CA.

Symposium on Research Frontiers in Virtual Reality:

PROGRAM: This symposium is a forum dedicated to exploring current issues and defining future directions in virtual reality research. Symposium activities will range from formal technical presentations to open discussion sessions. Virtual reality refers to the use of three-dimensional displays and interaction devices to explore real-time computer-generated environments.

SYMPOSIUM CO-CHAIRS: S. Bryson, CSC/NASA Ames Res. Ctr. and S. Feiner, Columbia U.

SYMPOSIUM TOPICS: Display and interaction hardware including tracking, gesture recognition, and graphics/audio/force/tactile displays; software architectures; interaction techniques; environment design; human factors; applications to visualization.

INFORMATION: S. Bryson, e-mail (preferred): bryson@nas.nasa.gov or 415-604-4524 for information on symposium format and submission guidelines.

Symposium on Parallel Rendering:

PROGRAM: The growing acceptance of parallel computing has led to a recent surge of interest in parallel rendering techniques for computer graphics applications. This symposium will provide a high-quality techni-

cal program in an informal atmosphere.

SYMPOSIUM CO-CHAIRS: T. Crockett, ICASE; C. Hansen, Los Alamos National Lab.; S. Whitman, Lawrence Livermore National Lab.

SYMPOSIUM TOPICS: Polygon scan conversion; ray tracing; radiosity; volume rendering; constructive solid geometry; surface generation; scientific visualization; massively parallel computation; performance analysis; I/O and display issues; architectural impact on algorithms.

INFORMATION: prs93-info@icase.edu or call T. Crockett at 804-864-2182 for more information on symposium format and submission guidelines.

25-29. **Third SIAM Conference on Geometric Design**, Seattle, WA. (Jul./Aug. 1992, p. 632)

27-30. **Seventh International Conference on Domain Decomposition Methods**, Penn State University, State College, PA. (Oct. 1992, p. 950)

* 31. **Tutorial on NURBS**, Tempe, AZ.

ORGANIZER: G. Farin, Arizona State U.

INFORMATION: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; 215-382-9800; Fax: 215-386-7999; meetings@siam.org.

* 31. **Tutorial on Data Reduction and Decomposition Techniques for Curves and Surfaces.**

ORGANIZER: T.J. Lyche, U. of Oslo, Norway.

INFORMATION: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; 215-382-9800; Fax: 215-386-7999; meetings@siam.org.

31-November 6. **Algorithmische Methoden der Diskreten Mathematik**, Oberwolfach, Federal Republic of Germany. (Mar. 1992, p. 251)

November 1993

1-5. **Third SIAM Conference on Geometric Design**, Tempe, AZ. (Dec. 1992, p. 1284)

6-7. **Western Section**, Harvey Mudd College, Claremont, CA.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

15-19. **IMA Workshop on Random Discrete Structures**, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN. (Jan. 1993, p. 63)

15-19. **Systèmes d'Équations Algébriques**, CIRM, Marseille, France. (Jan. 1993, p. 63)

*15-19. **Supercomputing '93**, Portland, Oregon.

PROGRAM: This, the sixth in a series of highly successful and well-attended conferences, will bring together scientists, engineers, designers, and managers from all areas of high-performance computing and communications. Conference participants will report on advances and experiences, discuss needs, suggest future directions, and exchange information, both formally and informally. One can become involved in Supercomputing '93 through the technical program, tutorials, workshops, student program, or industry exhibit. The **technical program** will cover applications in a number of disciplines and will feature invited and contributed papers, panels, posters, and research exhibits. The **tutorials and workshops** will feature experts on both the art and application of high-performance computing and communications. The **industry exhibit** will feature the latest in hardware, software, applications, systems, and services. There will also be an extensive program for students.

INFORMATION: R.R. Borchers, Supercomputing '93 Conference Chair, Lawrence Livermore National Laboratory, 7000 East Avenue, L-414, Livermore, CA 94551; phone and fax: 1-800-GO-2-SC93 (1-800-462-7293). Current conference information is available through anonymous ftp at SC93-info.llnl.gov.

21-27. **Mathematische Modelle in der Biologie**, Oberwolfach, Federal Republic of Germany. (Mar. 1992, p. 251)

22-26. **Géométrie Symplectique et Physique Mathématique**, CIRM, Marseille, France. (Jan. 1993, p. 63)

22-27. **Géométrie Symplectique**, Marseille, France. (Feb. 1993, p. 187)

28-December 4. **Nonlinear Equations in Many-Particle Systems**, Oberwolfach, Federal Republic of Germany. (Mar. 1992, p. 251)

December 1993

1-4. **Joint Meeting with the Sociedad Matemática Mexicana**, Merida, Yucatan, Mexico.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

5-9. **1993 International Symposium on Nonlinear Theory and its Applications (NOLTA '93)**, Hawaii. (Apr. 1993, p. 414)

5-11. **Dynamical Zeta Functions**, Oberwolfach, Federal Republic of Germany. (Feb. 1993, p. 187)

5-11. **Model Selection**, Oberwolfach, Federal Republic of Germany. (Feb. 1993, p. 187)

6-10. **International Congress on Modelling Simulation, 1993**, University of Western Australia, Perth. (Feb. 1993, p. 187)

12-18. **General Principles of Discretization Algorithms, Theory, and Applications**, Oberwolfach, Federal Republic of Germany. (Feb. 1993, p. 187)

12-18. **Methoden und Verfahren der Mathematischen Physik**, Oberwolfach, Federal Republic of Germany. (Feb. 1993, p. 187)

January 1994

January-June 1994. **A Semester at CRM: Bifurcations and the Geometry of Vector Fields**, Université de Montréal. (Jan. 1993, p. 63)

2-8. **Modelltheorie**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 285)

4-7. **International Symposium on Visco-Elastic Fluids**, Tobago (In the Republic of Trinidad and Tobago). (Feb. 1993, p. 187)

4-8. **International Conference on Harmonic Analysis and Operator Theory**, Caracas, Venezuela. (Jan. 1993, p. 64)

5-7. **Semigroup Theory**, Hobart, Tasmania, Australia. (Feb. 1993, p. 187)

9-15. **Algebraic Combinatorics: Association Schemes and Representation Theory**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 285)

12-15. **Joint Mathematics Meetings**, Cincinnati, OH (including the annual meetings of the AMS, AWM, MAA, and NAM).

INFORMATION: H. Daly, AMS, P.O. Box 6887, Providence, RI 02940.

*23-25. **Fifth Annual ACM-SIAM Symposium on Discrete Algorithms**, Arlington, VA.

ORGANIZER: D.D. Sleator, Carnegie Mellon U.

CALL FOR PAPERS: Abstract deadline: July 6, 1993.

INFORMATION: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; 215-382-9800; Fax: 215-386-7999; e-mail: meetings@siam.org.

23-29. **Singulare Integral- und Pseudo-Differential-Operatoren und Ihre Anwendungen**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 285)

24-28. **IMA Workshop on Mathematical Population Genetics**, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN. (Jan. 1993, p. 64)

30-February 5. **Nichtstandardanalysis und Anwendungen**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 285)

February 1994

February 1994. **Workshop on Dynamical Disease**, Laurentian Mountains north of Montréal. (Jan. 1992, p. 64)

2-4. **IMACS Symposium on Mathematical Modelling**, Vienna, Austria. (Sep. 1992, p. 775)

6-12. **C*-Algebren**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 285)

13-19. **Funktionentheorie**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 285)

20-26. **Harmonische Analyse und Darstellungstheorie Topologischer Gruppen**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

27-March 5. **Mathematical Economics**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

28-March 4. **IMA Workshop on Stochastic Networks**, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN. (Jan. 1993, p. 64)

March 1994

6-12. **Mathematische Stochastik**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

13-19. **Elementare und Analytische Zahlentheorie**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

18-19. **Southeastern Section**, University of Kentucky, Lexington, Kentucky.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

20-26. **Regelungstheorie**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

*21-25. **IMA Period of Concentration: Stochastic Problems for Nonlinear Partial Differential Equations**, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN.

INFORMATION: Institute for Mathematics and its Applications, University of Minnesota, 514 Vincent Hall, 206 Church St., SE, Minneapolis, MN 55455.

25-26. **Central Section**, Kansas State University, Manhattan, KS.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

27-April 2. **Algebraische Gruppen**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

27-April 2. **Endliche Modelltheorie**, Ober-

Meetings and Conferences

wolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

April 1994

3–9. **Arbeitsgemeinschaft Mit Aktuellem Thema (wird in den Mitteilungen der DMV Heft 1/1994 Bekanntgegeben)**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

5–11. **Effective Methods in Algebraic Geometry (MEGA '93)**, Santander, Spain. (Mar. 1993, p. 286)

9–10. **Eastern Section**, Polytechnic University, Brooklyn, NY.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

10–16. **Numerical Linear Algebra with Applications**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

17–23. **Designs and Codes**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

24–30. **Geschichte der Mathematik**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

May 1994

1–7. **Gruppentheorie**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

2–6. **IMA Workshop on Image Models (and Their Speech Model Cousins)**, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN. (Jan. 1993, p. 64)

2–6. **International Conference on Topological Vector Spaces, Algebras, and Related Areas**, McMaster University, Hamilton, Ontario, Canada. (Mar. 1993, p. 286)

8–14. **Variationsrechnung**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

15–21. **Critical Phenomena in Spatial Stochastic Models**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 286)

16–20. **IMA Workshop on Stochastic Models in Geosystems**, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN. (Jan. 1993, p. 64)

16–20. **Géométrie Algébrique**, CIRM, Marseille, France. (Jan. 1993, p. 64)

22–28. **Diskrete Geometrie**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 287)

24–27. **Conference on Hermann G. Graßmann (1809–1877)**, Isle of Rügen, Germany. (September 1992, p. 775)

29–June 4. **Singulare Störungsrechnung**,

Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 287)

30–June 9. **Workshop on Group Representation Theory**, Technion, Israel Institute of Technology, Haifa, Israel. (Dec. 1992, p. 1284)

31–June 3. **IMA Minisymposium on Phase Transitions in Catalytic Surface Reaction Models**, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN. (Jan. 1993, p. 64)

June 1994

1–7. **1994 Barcelona Conference on Algebraic Topology**, Sant Feliu de Guixols (near Barcelona, Spain). (Jan. 1993, p. 64)

12–18. **Nichtlinearitäten vom Hysterisistyp**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 287)

13–17. **Fifth International Conference on Hyperbolic Problems Theory, Numerical Methods, and Applications**, Stony Brook, NY. (May/June 1992, p. 497)

* 13–17. **European Conference on Elliptic and Parabolic Problems**, Pont-à-Mousson, France.

CONFERENCE TOPICS: General theory of elliptic and parabolic problems; and the applications, free boundary problems, fluid mechanics, evolution problems in general, calculus of variations, homogenization, modeling, and numerical analysis.

INVITED SPEAKERS: H.W. Alt, Bonn; J. Carrillo, Madrid; D. Cioranescu, Paris VI; B. Dacorogna, Lausanne; G. Dal Maso, Trieste; G. Dziuk, Freiburg; C.M. Elliott, Sussex; A. Fasano, Florence; I. Fonseca, Carnegie Mellon; R. Glowinski, Houston; N. Kenmochi, Chiba; R.V. Kohn, NY; B. Larroutourou, INRIA; M. Luskin, Minneapolis; J.L. Lions, Collège de France; F. Murat, Paris VI; J. Necas, Prague; A. Pozio, Rome; L.A. Peletier, Leiden; P.H. Rabinowitz, Madison; R. Rannacher, Heidelberg; C. Sbordone, Naples; N.S. Trudinger, Canberra; N.N. Uraltseva, St. Petersburg; H.F. Weinberger, Minneapolis; E. Zuazua, Madrid.

CALL FOR PAPERS: In addition to the main lectures, parallel sessions of short communications will be organized. The deadline for submitting an abstract is January 1, 1994.

INFORMATION: C. Bandle, Mathematisches Inst. der Universität, Rheinsprung 21, CH-4051 Basel, Switzerland; tel: (61) 261 03 01; Fax: (61) 261 03 12; or M. Chipot, J. Saint Jean Paulin, I. Shafir, Univ. de Metz, Dept. de Math., Ile du Sauley, 57 045 Metz-Cedex 01, France; tel: 87 31 52 74; Fax: 87 31 52 73; or J. Bemelmans, RWTH Aachen, Inst. für Math., Templergraben 55,

5100 Aachen, Germany; tel: (241) 80 49 21; Fax: (241) 80 39 52.

Summer 1994. **Summer Regional Centers—TRANSIT**, Ohio State University, Columbus, OH. (Oct. 1992, p. 951)

13–17. **IMA Workshop on Classical & Modern Branching Processes**, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MN. (Jan. 1993, p. 64)

16–18. **Western Section**, University of Oregon, Eugene, Oregon.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

19–25. **Quantenmechanik von Vielteilchen Systemen**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 287)

19–25. **Integrable Systems from a Quantum Point of View**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 287)

20–24. **Probabilités Quantiques**, CIRM, Marseille, France. (Jan. 1993, p. 64)

* 25–July 2. **Symposium on Diophantine Problems in Honor of Wolfgang Schmidt's 60th Birthday**, Boulder, Colorado. (Please note this date was incorrectly listed in Apr. 1993, p. 410)

PROGRAM: Each day of the conference there will be lectures from three or four invited speakers. There will also be special sessions of shorter talks.

INVITED SPEAKERS: *Tentative*: A. Baker (Cambridge), J. Beck (Rutgers), W.D. Brownawell (Penn State), J. Coates (Cambridge), D.W. Masser (Basel), P. Philippon (Paris), P. Sarnak (Princeton), H.P. Schlickewei (Ulm), A. Schinzel (Warsaw), J. Silverman (Brown), H. Stark (San Diego), C.L. Stewart (Waterloo), R. Tijdeman (Leiden), R.C. Vaughan (Imperial), P. Vojta (Berkeley), M. Waldschmidt (Paris), G. Wüstholz (Zürich).

INFORMATION: D. Grant and R. Tubbs, Dept. of Math., Campus Box 395, University of Colorado, Boulder, CO 80309; or e-mail: meetings@euclid.colorado.edu.

26–July 2. **Graphentheorie**, Oberwolfach, Federal Republic of Germany. (Mar. 1993, p. 287)

* 26–July 2. **Inverse Problems**, Lake St. Wolfgang, Austria.

PROGRAM: This is the first in a series of conferences on inverse problems to be organized for SIAM and GAMM by D. Colton (Delaware), H.W. Engl (Linz), A. Louis (Saarbrücken), and W. Rundell (Texas A&M).

INFORMATION: H.W. Engl, Johannes Kepler Universität, A-4040 Linz, Austria; e-mail: engl@indmath.uni-linz.ac.at.

Meetings and Conferences

August 1994

3–11. **The International Congress of Mathematicians 1994**, Zürich, Switzerland. (Oct. 1992, p. 951)

15–17. **Mathfest**, University of Minnesota, Minneapolis, MN (including the summer meetings of the AMS, AWM, MAA, and PME).

INFORMATION: H. Daly, AMS, P.O. Box 6887, Providence, RI 02940.

* 15–19. **Fifteenth International Symposium on Mathematical Programming**, University of Michigan, Ann Arbor, MI. (Please note that this date was previously listed incorrectly in April 1993, p. 416.)

INFORMATION: Send e-mail to xvism@um.cc.umich.edu or write to 15th International Symposium on Mathematical Programming, Conferences and Seminars, 541 Thompson St., Room 112, Univ. of Michigan, Ann Arbor, MI 48109-1360; Fax: 313-764-2990.

October 1994

28–29. **Central Section**, Oklahoma State University, Stillwater, Oklahoma.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

November 1994

11–13. **Southeastern Section**, University of Richmond, Richmond, VA.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

January 1995

4–7. **Joint Mathematics Meetings**, San Francisco, CA (including the annual meetings of the AMS, AWM, MAA, and NAM).

INFORMATION: H. Daly, AMS, P.O. Box 6887, Providence, RI 02940.

March 1995

24–25. **Central Section**, DePaul University, Chicago, IL.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

November 1995

3–4. **Central Section**, Kent State University, Kent, Ohio.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

January 1996

10–13. **Joint Mathematics Meetings**, Orlando, Florida (including the annual meetings of the AMS, AWM, MAA, and NAM).

INFORMATION: H. Daly, AMS, P.O. Box 6887, Providence, RI 02940.

March 1996

22–23. **Central Section**, University of Iowa, Iowa City, Iowa.

INFORMATION: W. Drady, AMS, P.O. Box 6887, Providence, RI 02940.

The following new announcements will not be repeated until the criteria in the last paragraph in the box at the beginning of this section are met.

New Series from the AMS

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Felix E. Browder, Editor

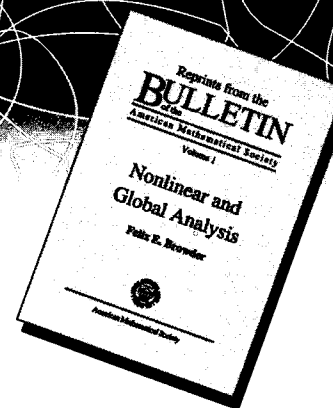
Volume 1

This volume contains a number of research-expository articles that appeared in the *Bulletin of the AMS* between 1979 and 1984 and that address the general area of nonlinear functional analysis and global analysis and their applications. The central theme concerns qualitative methods in the study of nonlinear problems arising in applied mathematics, mathematical physics, and geometry. Since these articles first appeared, the methods and ideas they describe have been applied in an ever-widening array of applications. Readers will find this collection useful, as it brings together a range of influential papers by some of the leading researchers in the field.

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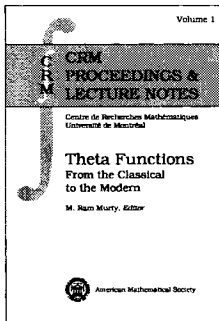
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CRM PROCEEDINGS AND LECTURE NOTES



Theta Functions: From the Classical to the Modern M. Ram Murty, Editor Volume 1

This book contains lectures on theta functions written by experts well known for excellence in exposition. The lectures represent the content of four courses given at the Centre de Recherches Mathématiques in Montréal during the academic year 1991–1992, which

was devoted to the study of automorphic forms. Aimed at graduate students, the book synthesizes the classical and modern points of view in theta functions, concentrating on connections to number theory and representation theory. An excellent introduction to this important subject of current research, this book is suitable as a text in advanced graduate courses.

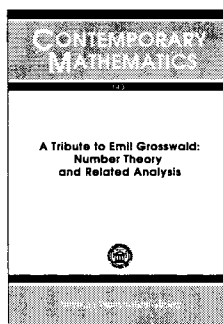
Contents

Preface; **B. C. Berndt**, *Ramanujan's theory of theta-functions*; **J. Hoffstein**, *Eisenstein series and theta functions on the metaplectic group*; **D. Prasad**, *Weil representation, Howe duality, and the theta correspondence*; **S. Gelbart**, *On theta-series liftings for unitary groups*.

(continued)

1991 *Mathematics Subject Classification*: 11F27, 11F37, 11F57, 11F70; 22E55, 33D10, 33E25
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CONTEMPORARY MATHEMATICS



A Tribute to Emil Grosswald: Number Theory and Related Analysis Marvin Knopp and Mark Sheingorn, Editors Volume 143

Emil Grosswald was a mathematician of great accomplishment and remarkable breadth of vision. This volume pays tribute to the span of his mathematical interests, which is reflected in the wide range of papers collected here. With contributions by leading contemporary researchers in number theory, modular functions, combinatorics, and related analysis, this book will interest graduate students and specialists in these fields. The high quality of the articles and their close connection to current research trends make this volume a must for any mathematics library.

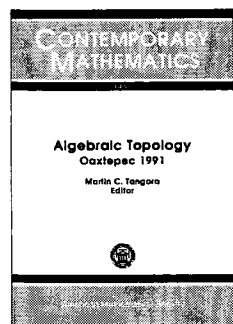
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Preface; *In appreciation of Emil Grosswald*; *Ph.D. students of Emil Grosswald*; *Publications of Emil Grosswald*; **G. Almkvist**, *A rather exact formula for the number of plane partitions*; **G. E. Andrews**, *On Ramanujan's empirical calculation for the Rogers-Ramanujan identities*; **P. T. Bateman**, *Integers expressible in a given number of ways as a sum of two squares*; **B. C. Berndt and J. L. Hafner**, *A theorem of Ramanujan on certain alternating series*; **D. M. Bressoud and S.-Y. Wei**, *Combinatorial equivalence of definitions of the Schur function*; **N. Celnicker, S. Poulos, A. Terras, C. Trimble, and E. Velasquez**, *Is there life on finite upper half planes?*; **Y.J. Choie and D. Zagier**, *Rational period functions for $PSL(2, \mathbb{Z})$* ; **L. A. Parson**, *Rational period functions and indefinite binary quadratic forms, III*; **D. V. Chudnovsky and G. V. Chudnovsky**, *Hypergeometric and modular function identities, and new rational approximations to and continued fraction expansions of classical constants and functions*; **H. Cohn**, *Orbital modular equations*; **B. A. Datskovsky**, *A mean-value theorem for class numbers of quadratic extensions*; **F. Delmer and J.-M. Deshouillers**, *On a generalization of Farey sequences, I*; **H. G. Diamond, H. Halberstam, and H.-E. Richert**, *Sieve auxiliary functions II*; **W. Duke**

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and H. Iwaniec, *A relation between cubic exponential and Kloosterman sums*; L. Ehrenpreis, *Function theory for Rogers-Ramanujan-like partition identities*; P. Erdős, D. J. Newman, and J. Knappenberger, *Forcing two sums simultaneously*; R. J. Evans, K. B. Stolarsky, and J. J. Wavrik, *Difference polynomials*; J. E. Friedman, *An application of Ehrenpreis's basis method to the Rogers-Ramanujan identities*; J. Galambos, *Extensions of some extremal properties of prime divisors to Poisson limit theorems*; E. Gethner, *Rational period functions with irrational poles are not Hecke eigenfunctions*; D. Goldfeld and J. Hoffstein, *On the number of Fourier coefficients that determine a modular form*; S. M. Gonek, *An explicit formula of Landau and its applications to the theory of the zeta-function*; B. Gordon and K. Hughes, *Multiplicative properties of η -products II*; M. J. Grady and M. Newman, *Counting subgroups of given index in Hecke groups*; J. L. Hafner, P. Sarnak, and K. McCurley, *Relatively prime values of polynomials*; P. Hags, Jr., *A new proof that every odd triperfect number has at least twelve prime factors*; J. H. Hawkins and M. I. Knopp, *A Hecke-Weil correspondence theorem for automorphic integrals on $\Gamma_0(N)$, with arbitrary rational period functions*; J. Lehner, *Lagrange's theorem for Hecke triangle groups*; M. R. Murty and V. K. Murty, *Base change and the Birch-Swinnerton-Dyer conjecture*; D. J. Newman, *A "natural" proof of the non-vanishing of L-series*; A. M. Odlyzko and C. M. Skinner, *Nonexistence of Siegel zeros in towers of radical extensions*; L. A. Parson, *Modular integrals and indefinite binary quadratic forms*; R. A. Rankin, *Diagonalizing Eisenstein series, II*; D. Rosen, *Multiplier systems for the Hecke groups $G(\sqrt{2})$ and $G(\sqrt{3})$* ; M. Sheingorn, *Low height Hecke triangle group geodesics*; T. R. Shemanske and L. H. Walling, *On the Shimura lift for Hilbert modular forms*; H. M. Stark, *Dirichlet's class-number formula revisited*; D. Zeilberger, *Closed form (pun intended!)*; D. Zeilberger, *Gert Almkvist's generalization of a mistake of Bourbaki*.

1991 Mathematics Subject Classification: 05A16, 05A30, 11-06, 14H45, 33C05
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**Algebraic Topology:
 Oaxtepec 1991**
 Martin C. Tangora, Editor
 Volume 146

This book consists of twenty-nine articles contributed by participants of the International Conference in Algebraic Topology held in July 1991 in Oaxtepec, Mexico. In addition to papers on current research, there are several surveys and expositions on the work of

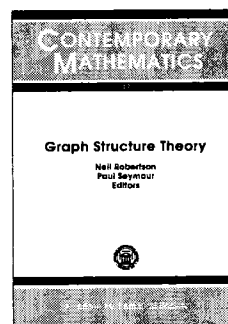
Mark Mahowald, whose sixtieth birthday was celebrated during the conference. The conference was truly international, with over 130 mathematicians from fifteen countries. It ended with a spectacular total eclipse of the sun, a photograph of which appears as the frontispiece. The papers range over much of algebraic topology and cross over into related areas, such as K -theory, representation theory, and Lie groups. Also included is a chart of the Adams spectral sequence and a bibliography of Mahowald's publications.

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Preface; List of speakers; List of participants; H. R. Miller and D. C. Ravenel, Mark Mahowald's work on the homotopy groups of spheres; D. M. Davis, Immersions of projective spaces: a historical survey; D. Blanc, Abelian Π -algebras and their projective dimension; J. M. Boardman, Modular representations on the homology of powers of real projective space; R. R. Bruner, Ext in the nineties; F. R. Cohen and L. R. Taylor, On the representation theory associated to the cohomology of configuration spaces; P. Goerss, J. Lannes, and F. Morel, Hopf algebras, Witt vectors, and Brown-Gitler

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Graph Structure Theory
 Neil Robertson
 and Paul Seymour,
 Editors
 Volume 147

This volume contains the proceedings of the AMS-IMS-SIAM Joint Summer Research Conference on Graph Minors, held at the University of Washington in Seattle in the summer of 1991.

Among the topics covered are algorithms on tree-structured graphs, well-quasi-ordering, logic, infinite graphs, disjoint path problems, surface embeddings, knot theory, graph polynomials, matroid theory, and combinatorial optimization.

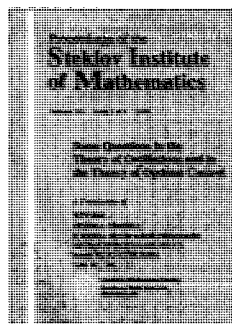
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W. T. Tutte, Polynomials; J. Oxley and G. Whittle, Tutte invariants for 2-polymatroids; J. P. S. Kung, Extremal matroid theory; T. M. Przytycka and J. H. Przytycki, Subexponentially computable truncations of Jones-type polynomials; D. J. A. Welsh, Knots and braids: some algorithmic questions; N. Robertson, P. D. Seymour, and R. Thomas, A survey of linkless embeddings; Y. C. de Verdière, On a new graph invariant and a criterion for planarity; O. Borodin, Four problems on plane graphs raised by Branko Grünbaum; B. Reed, Counterexamples to a conjecture of Las Vergnas and Meyniel; B. Bollobás, B. Reed, and A. Thomason, An extremal function for the achromatic number; H. J. Prömel and A. Steger, The asymptotic structure of H -free graphs; M. Fellows, J. Kratochvíl, M. Middendorf, and F. Pfeiffer, Induced minors and related problems; A. Schrijver, Induced circuits in graphs on surfaces; A. Frank and T. Jordán, Tree-representation of directed circuits; W. McCuaig, Intercyclic digraphs; J. Bang-Jensen and S. Poljak, Eulerian trails through a set of terminals in specific, unique, and all orders; H. Okamura, 2-reducible cycles containing two specified edges in $(2k + 1)$ -edge-connected

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1991 *Mathematics Subject Classification*: 05C75, 05C40, 05C10; 05C15, 05C38, 05B35, 05C85, 57M25, 57M15, 06A06, 68R10
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Some Questions in the Theory of Oscillations and the Theory of Optimal Control

R. V. Gamkrelidze, Editor
 Volume 197

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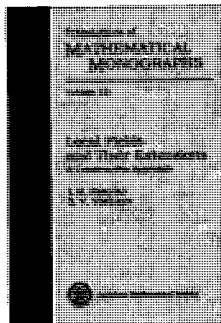
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E. F. Mishchenko and A. Yu. Kolesov, *Asymptotic theory of relaxation oscillations*; **M. I. Zelikin and V. F. Borisov**, *Regimes with increasingly more frequent switchings in optimal control problems*.

(continued)

1991 *Mathematics Subject Classification*: 34C23, 34D05, 34E15, 49K15, 58F14, 93B50, 93C15; 34C20, 34C45, 34D30, 34E05, 58F05, 58F21, 93C85
 ISBN 0-8218-3148-8, LC 93-7068, ISSN 0081-5438
 186 pages (softcover), May 1993
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TRANSLATIONS OF MATHEMATICAL
 MONOGRAPHS



Local Fields and Their Extensions: A Constructive Approach
I. B. Fesenko and S. V. Vostokov
 Volume 121

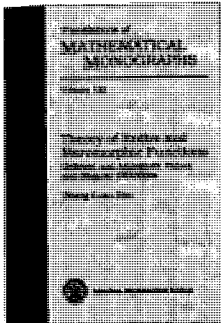
This book is devoted to the study of complete discrete valuation fields with perfect residue fields. One special feature is the absence of cohomology; although most specialists would find it difficult to conceive of serious discussions in this area without the application of cohomology groups, the authors believe that many problems can be presented more rationally when based on more natural, explicit constructions. In addition, a cohomology-free treatment seems to be preferable for those who are first encountering this subject. The main prerequisite is a standard graduate course in algebra, and familiarity with p -adic fields is also helpful background.

"[This] book contains vast information on local fields. It offers the reader the possibility to see the beauty and diversity of this subject."
 —from the Foreword by I. R. Shafarevich

Contents

Complete discrete valuation fields; Extensions of discrete valuation fields; The norm map; Local class field theory. I; Local class field theory. II; The group of units in a p -adic field; Explicit formulas for the Hilbert norm residue symbol; Explicit formulas for the Hilbert pairing on formal groups; The Milnor K -groups of a local field.

1991 *Mathematics Subject Classification*: 11S31
 ISBN 0-8218-4613-2, LC 93-14840, ISSN 0065-9282
 283 pages (hardcover), May 1993
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Theory of Entire and Meromorphic Functions—Deficient and Asymptotic Values and Singular Directions

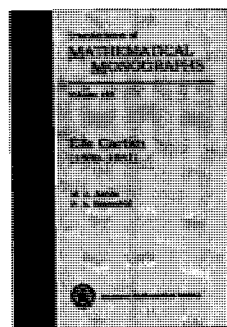
Zhang Guan-Hou
Translated by
Chung-Chun Yang
Volume 122

This book was originally written in Chinese in 1986 by the noted complex analyst Zhang Guan-Hou, who was a research fellow at the Academia Sinica. The book provides a basic introduction to the development of the theory of entire and meromorphic functions from the 1950s to the early 1980s. After an opening chapter introducing fundamentals of Nevanlinna's value distribution theory, this book discusses various relationships among and developments of three central concepts: deficient value, asymptotic value, and singular direction. This book describes many significant results and research directions developed by Zhang and other Chinese complex analysts, and published in Chinese mathematical journals. A comprehensive and self-contained reference, this book is useful for graduate students and researchers in complex analysis.

Contents

Preface; The Nevanlinna theory; The singular directions; The deficient value theory; The asymptotic value theory; The relationship between deficient values and asymptotic values of an entire function; The relationship between deficient values of a meromorphic function and direct transcendental singularities of its inverse functions; Some supplementary results.

1991 Mathematics Subject Classification: 30D30, 30D35
ISBN 0-8218-4589-6, LC 93-43, ISSN 0065-9282
375 pages (hardcover), May 1993
Individual member \$109, List price \$182, Institutional member \$146
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Élie Cartan (1869–1951)
M. A. Akivis
and B. A. Rosenfeld
Volume 123

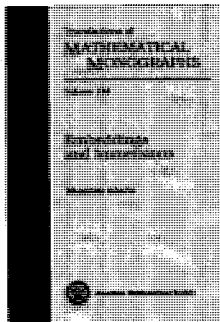
This book describes the life and achievements of the great French mathematician, Élie Cartan. Here readers will find detailed descriptions of Cartan's discoveries in Lie groups and algebras, associative algebras, differential equations, and differential geometry,

as well as later developments stemming from his ideas. The volume includes a biographical sketch of Cartan's life. A monumental tribute to a towering figure in the history of mathematics, this book will appeal to mathematicians and historians alike.

Contents

The life and the work of É. Cartan; Lie groups and algebras; Projective spaces and projective metrics; Lie pseudogroups and Pfaffian equations; The method of moving frames and differential geometry; Riemannian manifolds. Symmetric spaces; Generalized spaces; Appendix A. Rapport sur les travaux de M. Cartan by H. Poincaré; Appendix B. Sur une dégénérescence de la géométrie euclidienne; Appendix C. Allocution de M. Élie Cartan; Appendix D. The influence of France in the development of Mathematics.

(continued)



Embeddings and Immersions
Masahisa Adachi
Translated by Kiki Hudson
Volume 124

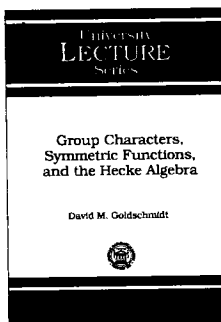
This book covers fundamental techniques in the theory of C^∞ -embeddings and C^∞ -immersions, emphasizing clear intuitive understanding and containing many figures and diagrams. Adachi starts with an introduction to the work of Whitney and of Haefliger on C^∞ -embeddings and C^∞ -manifolds. The Smale-Hirsch theorem is presented as a generalization of the classification of C^∞ -embeddings by isotopy and is extended by Gromov's work on the subject, including Gromov's convex integration theory. Finally, as an application of Gromov's work, Adachi introduces Haefliger's classification theorem of foliations on open manifolds. Also described here is Adachi's work with Landweber on the integrability of almost complex structures on open manifolds. This book would be an excellent text for upper-division undergraduate or graduate courses.

Contents

Preface to the English edition; Preface; Regular closed curves in the plane; C^r manifolds, C^r maps, and fiber bundles; Embeddings of C^∞ manifolds; Immersions of C^∞ manifolds; The Gromov convex integration theory; Foliations of open manifolds; Complex structures on open manifolds; Embeddings of C^∞ manifolds (continued).

1991 Mathematics Subject Classification: 57R40, 57R42; 58D10
ISBN 0-8218-4612-4, LC 93-7464, ISSN 0065-9282
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UNIVERSITY LECTURE SERIES



Group Characters, Symmetric Functions, and the Hecke Algebra
David M. Goldschmidt
Volume 4

Directed at graduate students and mathematicians, this book covers an unusual set of interrelated topics, presenting a self-contained exposition of the algebra behind the Jones polynomial along with various excursions into related areas. The book is made up of lecture notes from a course taught by Goldschmidt at the University of California at Berkeley in 1989. The course was organized in three parts. Part I covers, among other things, Burnside's Theorem that groups of order $p^a q^b$ are solvable, Frobenius' Theorem on the existence of Frobenius kernels, and Brauer's characterization of characters. Part II covers the classical character theory of the symmetric group

and includes an algorithm for computing the character table of S^n ; a construction of the Specht modules; the “determinant form” for the irreducible characters; the hook-length formula of Frame, Robinson, and Thrall; and the Murnaghan-Nakayama formula. Part III covers the ordinary representation theory of the Hecke algebra, the construction of the two-variable Jones polynomial, and a derivation of Ocneanu’s “weights” due to T. A. Springer.

Contents

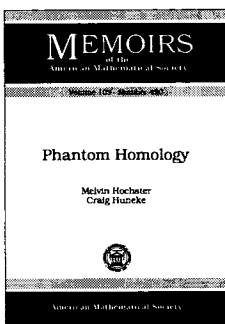
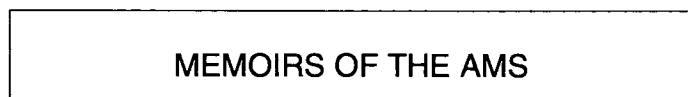
Part I: Finite-dimensional algebras; Group characters; Divisibility; Induced characters; Further results; **Part II:** Permutations and partitions; The irreducible characters of S^n ; The Specht modules; Symmetric functions; The Schur functions; The Littlewood-Richardson ring; Two useful formulas; **Part III:** The Hecke algebra; The Markov trace.

1991 Mathematics Subject Classification: 20C15, 20C30, 20F36, 57M25
 ISBN 0-8218-7003-3, LC 92-43284, ISSN 1047-3998

73 pages (softcover), June 1993

Individual member \$42, List price \$70, Institutional member \$56

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Phantom Homology
 Melvin Hochster
 and Craig Huneke
 Volume 103, Number 490

This book uses a powerful new technique, tight closure, to provide insight into many different problems that were previously not recognized as related. The authors develop the notion of weakly Cohen-Macaulay rings or modules and prove some very general acyclicity theorems. These theorems are applied to the new theory of phantom homology, which uses tight closure techniques to show that certain elements in the homology of complexes must vanish when mapped to well-behaved rings. These ideas are used to strengthen various local homological conjectures. Initially, the authors develop the theory in positive characteristic, but it can be extended to characteristic 0 by the method of reduction to characteristic p . The book is suitable for an advanced graduate course in commutative algebra.

Contents

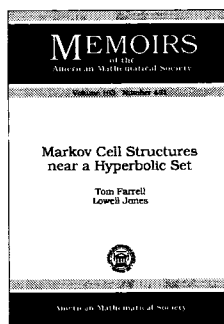
Introduction; Minheight and the weak Cohen-Macaulay property; Acyclicity criteria with denominators for complexes of modules; Vanishing theorems for maps of homology via phantom acyclicity; Regular closure; Intersection theorems via phantom acyclicity.

1991 Mathematics Subject Classification: 13A35, 13D25, 13E05
 ISBN 0-8218-2556-9, LC 93-463, ISSN 0065-9266

91 pages (softcover), May 1993

Individual member \$17, List price \$29, Institutional member \$23

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Markov Cell Structures near a Hyperbolic Set
 Tom Farrell
 and Lowell Jones

Volume 103, Number 491

Let $F : M \rightarrow M$ denote a self-diffeomorphism of the smooth manifold M and let $\Lambda \subset M$ denote a hyperbolic set for F . Roughly speaking, a Markov cell structure for $F : M \rightarrow M$

near Λ is a finite cell structure C for a neighborhood of Λ in M such that, for each cell $e \in C$, the image under F of the unstable factor of e is equal to the union of the unstable factors of a subset of C , and the image of the stable factor of e under F^{-1} is equal to the union of the stable factors of a subset of C . The main result of this work is that for some positive integer q , the diffeomorphism $F^q : M \rightarrow M$ has a Markov cell structure near Λ . A list of open problems related to Markov cell structures and hyperbolic sets can be found in the final section of the book.

Contents

Introduction; Some linear constructions; Proofs of propositions 2.10 and 2.14; Some smooth constructions; The foliation hypothesis; Smooth triangulation near Λ ; Smooth ball structures near Λ ; Triangulating image balls; The thickening theorem; Results in P. L. topology; Proof of the thickening theorem; The limit theorem; Construction of Markov cells; Removing the foliation hypothesis; Selected problems; References.

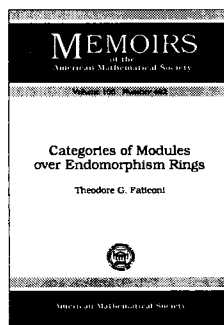
1991 Mathematics Subject Classification: 58F15, 58F12, 58F09; 57R05, 57R30, 57R50

ISBN 0-8218-2553-4, LC 93-464, ISSN 0065-9266

138 pages (softcover), May 1993

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Categories of Modules over Endomorphism Rings

Theodore G. Faticoni
 Volume 103, Number 492

The goal of this work is to develop a functorial transfer of properties between a module A and the category \mathcal{M}_E of right modules over its endomorphism ring E that is more sensitive than the

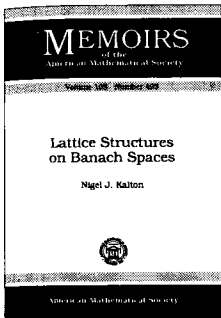
traditional starting point $\text{Hom}(A, \cdot)$. The main result is a factorization $q_A t_A$ of the left adjoint T_A of $\text{Hom}(A, \cdot)$, where t_A is a category equivalence and q_A is a forgetful functor. Applications include a characterization of the finitely generated submodules of the right E -modules $\text{Hom}(A, G)$, a connection between quasi-projective modules and flat modules, an extension of some recent work on endomorphism rings of Σ -quasi-projective modules, an extension of Fuller’s Theorem, characterizations of several self-generating properties and injective properties, and a connection between Σ -self-generators and quasi-projective modules.

Contents

Construction of the categories; Tensor and Hom functors; Category equivalences; Special morphisms; Category Equivalences for H_A ; Projective properties in $\mathcal{M}(\mathcal{P}_A)$; Injective properties.

(continued)

1991 *Mathematics Subject Classification*: 16D70, 16D90, 16E50, 16P40, 16P60, 16S50, 16U50, 20K15, 20K35
 ISBN 0-8218-2554-2, LC 93-465, ISSN 0065-9266
 140 pages (softcover), May 1993
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Lattice Structures on Banach Spaces

Nigel J. Kalton

Volume 103, Number 493

The general problem addressed in this work is to characterize the possible Banach lattice structures that a separable Banach space may have. The basic questions of uniqueness of lattice structure for function spaces have been studied before, but here the approach uses

random measure representations for operators in a new way to obtain more powerful conclusions. A typical result is the following: If X is a rearrangement-invariant space on $[0, 1]$ not equal to L_2 , and if Y is an order-continuous Banach lattice which has a complemented subspace isomorphic as a Banach space to X , then Y has a complemented sublattice which is isomorphic to X (with one of two possible lattice structures). New examples are also given of spaces with a unique lattice structure.

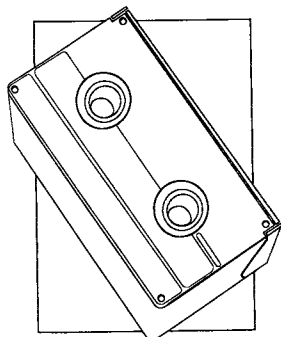
Contents

Introduction; Banach lattices and Köthe function spaces; Positive operators; The basic construction; Lower estimates on P ; Reduction to the case of an atomic kernel; Complemented subspaces of Banach lattices; Strictly 2-concave and strictly 2-convex structures; Uniqueness of lattice structure; Isomorphic embeddings; References.

1991 *Mathematics Subject Classification*: 46B30, 46E30; 46E05
 ISBN 0-8218-2557-7, LC 93-466, ISSN 0065-9266
 92 pages (softcover), May 1993

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VIDEOTAPES



Interview with I. M. Gelfand

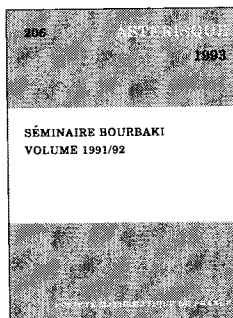
In this one-hour interview, I. M. Gelfand, one of the major mathematicians of the century, discusses his mathematics, his inspirations, and his major achievements. He also touches on his work in biology and education, two areas in which he has had an important impact. The interview was held during the Joint

Mathematics Meetings in Baltimore in January 1992, not long after Gelfand left the former Soviet Union to take a position at Rutgers University. Providing a personal look at this great mathematician, the interview will have particular appeal for students, researchers, and historians in mathematics and science. In addition, because Gelfand avoids discussing technical aspects of his work and focuses on what

interests and inspires him as a mathematician, this videotape would be accessible to a general audience.

1991 *Mathematics Subject Classification*: 00, 01
 ISBN 0-8218-8084-5
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SOCIÉTÉ MATHÉMATIQUE DE FRANCE, ASTÉRISQUE



Séminaire Bourbaki, Volume 1991/1992

Number 206

Comme les précédents volumes de ce Séminaire, celui-ci contient quinze exposés de synthèse sur des sujets d'actualité: quatre exposés de géométrie algébrique, deux de géométrie Riemannienne ou Kählérienne, trois sur les systèmes dynamiques, un de physique théorique, un d'équations aux

dérivées partielles, deux d'analyse, un d'algèbre, et un sur les fonction hypergéométriques. On y trouve en particulier les résultats récents sur les tores invariants en dynamique hamiltonienne et non hamiltonienne, la solution du problème de Siegel sur la linéarisation d'une application holomorphe au voisinage d'un point fixe, l'état des connaissances sur les surfaces minimales plongées dans \mathbb{R}^3 , sur les fonctions L des motifs, les revêtements des courbes algébriques en caractéristique positive, et l'analyse harmonique sur les fractals.

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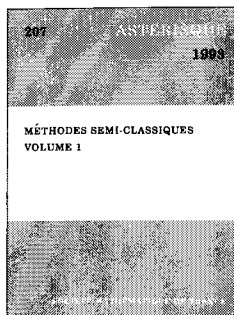
Contents

Novembre 1991: J. Bellissard, *Le papillon de Hofstadter* [d'après B. Helffer et J. Sjöstrand]; **P. Cartier**, *Démonstration "automatique" d'identités et fonctions hypergéométriques* [d'après D. Zeilberger]; **E. Ghys**, *Dynamique des flots unipotents sur les espaces homogènes*; **N. Hitchin**, *Hyperkähler manifolds*; **J.-P. Serre**, *Revêtements de courbes algébriques*; **Février 1992: D. Bertrand**, *Groupes algébriques et équations différentielles linéaires*; **J.-M. Fontaine**, *Valeurs spéciales des fonctions L des motifs*; **J.-L. Loday**, *Excision en K -théorie algébrique* [d'après A. Suslin et M. Wodzicki]; **R. Pérez-Marco**, *Solution complète au problème de Siegel de linéarisation d'une application holomorphe au voisinage d'un point fixe* [d'après J.-C. Yoccoz]; **J.-C. Yoccoz**, *Travaux de Herman sur les tores invariants*; **M. Barlow**, *Harmonic analysis on fractal spaces*; **H. Carayol**, *Variétés de Drinfeld compactes*, d'après Laumon, Rapoport et Stuhler; **P. Gérard**, *Résultats récents sur les fluides parfaits incompressibles bidimensionnels* [d'après J.-Y. Chemin et J.-M. Delort]; **L. Pastur**, *Eigenvalue distribution of random operators and matrices*; **H. Rosenberg**, *Some recent developments in the theory of properly embedded minimal surfaces in \mathbb{R}^3* .

1991 *Mathematics Subject Classification*: 11, 14, 19, 32, 33, 35, 43, 53, 58, 76, 81

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**Méthodes
Semi-Classiques,
Volume 1**

Number 207

This volume contains the proceedings of the Summer School on Semi-Classical Methods, held in Nantes in June 1991. The School focused on courses by four experts: V. Ivrii (semi-classical spectral asymptotics), M. Shubin (spectral theory on noncompact varieties), A. Soffer

(N -body problems), and G. Uhlmann (inverse problems). Each of the courses presents the most recent results in the subject. Ivrii describes his powerful method for obtaining spectral asymptotics. Shubin discusses the connections between the geometry of noncompact varieties and the spectrum of elliptic operators. Soffer presents a proof of the asymptotic completeness for the N -body problem, obtained in collaboration with

I. M. Sigal. Uhlmann considers the inverse problem for a given boundary and for a given scattering at a fixed energy.

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Contents

Résumés des exposés; **V. Ivrii**, *Semiclassical spectral asymptotics*; **M. Shubin**, *Spectral theory of elliptic operators on non-compact manifolds*; **A. Soffer**, *On the main body problem in quantum mechanics*; **G. Uhlmann**, *Inverse boundary value problems and applications*.

1991 *Mathematics Subject Classification*: 35, 58, 81

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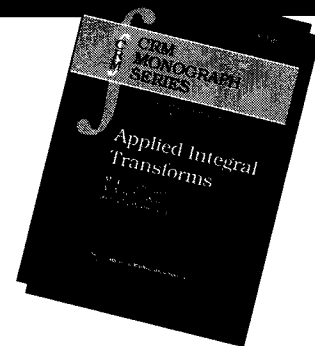
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This book does what few books on integral transforms do: it constructs the kernels of the integral transforms by solving the generalized Sturm–Liouville problems associated with the partial differential equations at hand. In the first part of the book, the authors construct the kernels and then use them to solve elementary problems of mathematical physics. This section, which proceeds mainly by examples and includes exercises, requires little mathematical background and provides an introduction to the subject of integral transforms.

In the second part of the book, the method of integral transforms is used to solve modern applied problems in convective stability, temperature fields in oil strata, and eddy current testing. The choice of topics reflects the authors' research experience and involvement in industrial applications. Because of the applications it discusses, the book will interest engineers (especially petroleum engineers) and physicists.

The CRM Monograph Series is jointly published by the American Mathematical Society and the Centre de Recherches Mathématiques.

1991 *Mathematics Subject Classification*: 35; 76, 80, 78, 44

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AMS Reports and Communications

Recent Appointments

Committee members' terms of office on standing committees expire on January 31 following the year given in parentheses following their names, unless otherwise specified.

Upon recommendation of the Editorial Boards Committee, the Council has elected William Fulton (1995) to the *Journal of the AMS Editorial Committee*. Continuing members of the committee are H. Blaine Lawson, Jr. (1994), Andrew M. Odlyzko (1994), Wilfried Schmid (1993), chair, and Elias M. Stein (1995).

Lawrence A. Shepp (1994) has been appointed by President Ronald L. Graham to the *Eastern Section Program Committee*. Continuing members of the committee are Roy L. Adler (1993), Lesley M. Sibner (*ex officio*), Birgit Speh (1994), and Gregg J. Zuckerman (1993), chair.

Richard A. Askey, Paul T. Bateman, Bettye Anne Case, Robert J. Daverman, Everett Pitcher, and Janice B. Walker have been appointed to a *Special 100th Meeting Celebration Committee* by President Ronald L. Graham. Professor Case will serve as chair.

Cathleen S. Morawetz (1995) has been appointed to the *Committee on Science Policy* by President Ronald L. Graham. Continuing members of the committee are Michael Artin (*ex officio*), James A. Donaldson (1993), Richard Ewing (1995), Eric M. Friedlander (1994), Ramesh A. Gangolli (*ex officio*), Ronald L. Graham (*ex officio*), Rhonda J. Hughes (1993), William H. Jaco (*ex officio*), Raymond L. Johnson (1994), Linda Keen (1993), Donald L. Kreider (*ex officio*), William James Lewis (1994), John W. Morgan (1995), Melvyn Nathanson (1995), Linda Preiss

Rothschild (1994), and Frank W. Warner III (1993), chair.

Idun Reiten (AMS), Mary Ellen Rudin (AMS), and William Yslas Velez (AMS) have been appointed by President Ronald L. Graham to the *AMS-SMM Joint Program Committee*. Robert M. Fossum (*ex officio*) will serve as coordinator. Continuing members of the committee are Jorge Andrés Ize Lamache (SMM), José Carlos Gómez Larrañaga (SMM), and Luis Gorostiza Ortega (SMM).

The Council Meeting in San Antonio

The Council met at 2:00 p.m. on Tuesday, 12 January 1993, in San Antonio, Texas. At one time thirty-two members were in attendance. President Artin presided.

The President called the meeting to order at about 2:05 p.m. He introduced the members of the Council, requested and received permission to grant privileges of the floor to members-elect of the Council, requested and received consent that the Secretary should extend thanks to retiring members of the Council, and announced several modifications to the agenda, including the deferral of an item to the April 1993 meeting, and the change of several items from the consent agenda to the action agenda.

It was announced that President Michael Artin; Vice-President Lenore Blum; Associate Treasurer Steve Armentrout; Associate Secretary Joseph A. Cima; Associate Secretary W. Wistar Comfort; Executive Committee Member Hugo Rossi; Members-at-Large Sheldon Axler, Joan Birman, Charles Herbert Clemens, Carl Pomerance, and Shing-Tung Yau; and *Mathematical Reviews* Editorial Committee Chair B. A. Taylor would retire from their current positions at the end of January 1993. However,

Artin will remain on the Council in the capacity of Ex-President. Birman and Jaffe will remain on the Council by virtue of having been elected to four-year terms on the Executive Committee, and Taylor has been appointed Associate Treasurer to replace Steve Armentrout. (Newly-elected members of the Council were announced in the January 1993 issue of the *Notices*, p. 68.)

The minutes of the September 1992 Council were approved with corrections that were noted by the Secretary.

The Council agreed to co-sponsor the Second World Congress on Neural Networks to be held in Portland, Oregon during the period 11–15 July 1993 and the Second International Congress on Ordinal Data Analysis to be held in Amherst, Massachusetts, during the period 15–17 October 1993.

Action on the report of the Special Committee on Prizes was deferred by request of the President and the Secretary.

A report from the Special Committee on Meetings is on file in the AMS Committee Report Book for 1992, Report No. 921109-01. This committee's recommendation was returned to the Special Committee on Meetings by a motion that was seconded and passed.

The Council considered adopting procedures for the Committee on Professional Ethics (COPE) subject to review by Society counsel.

The Council established a standing committee called the Committee on International Affairs with a charge that is on file in the Office of the Secretary. It also approved, in principle, the objectives and strategies for this committee.

The Council agreed that the Society will invite, on a quadrennial basis, the Committee to Select the Winner of the Blumenthal Prize to award its prize at an Annual Meeting of the Society and will

invite the grantee to deliver an address to the meeting of the Society.

The Council approved the following resolution:

The Council of the American Mathematical Society congratulates Martin Gardner on the occasion of the celebration of his many years of writing for the science community. Its members note with great appreciation the profound influence he has had on the many thousands of budding and practicing mathematicians and scientists who have enjoyed his *Scientific American* columns and his many books. They note that his unique ability to translate complex mathematical concepts and results to ordinary language with extraordinary clarity, enthusiasm, and humor has helped in fostering a better understanding by the public of what mathematics is and what mathematicians do.

The report of the Tellers for the 1992 election was approved.

While meeting in executive session, the Council approved the appointment of Andy Roy Magid as Associate Secretary for the Central Section and Lance Small as Associate Secretary for the Western Section, each for terms of two years beginning on 01 February 1994.

Also while meeting in executive session, the Council approved the recommendations of the Editorial Boards Committee and appointed members to several editorial committees as follows:

The Council appointed Gregory L. Cherlin to the *Transactions* and *Memoirs* Editorial Committee and William Fulton to the *Journal of the American Mathematical Society* Editorial Committee.

The Committee on Science Policy (CSP) filed a report, and Frank Warner, chair of the CSP, gave an oral report. A Discussion Paper on the Postdoctoral Program was considered by the Council. It then adopted the following recommendations of the CSP:

1. That the AMS advocate a gradual expansion of postdoctoral opportunities in mathematics with an eventual goal of 200 new appoint-

ments to postdoctoral positions per year with minimum two-year terms;

2. That new funds should be sought for postdoctorals so as not to reduce the already limited support available for established research mathematicians;

3. That this be a multiagency, multiprogram effort with differing sources of support appropriate to the different program models; and

4. That expansion of postdoctoral opportunities into new areas should be gradual and should be preceded by pilot projects designed to assess the need for and value of the new models.

A directive to the CSP was moved and seconded. After some discussion and some amendments, the Council passed the following:

The Council directs the CSP to prepare a satisfactory procedure for determining sizes of National Science Foundation (NSF) grants and to report this procedure to the Council, and the Council, following approval, propose this procedure to NSF.

The Council received routine reports from several committees. These reports are on file in the Office of the Secretary and may be obtained from the Secretary by request.

The report of the Special Committee on Nominating Procedures was submitted and considered by the Council. After slightly amending one point, the Council adopted the procedures that are listed below.

Procedures for the Nominating Committee (NC)

1. Procedures and scheduling for the nomination process shall remain as at present. The NC should make some start on its deliberations in December, but will not meet face-to-face until the Winter meeting.
2. In order to ensure communication

between the NC and the Council, there shall be an agenda item for discussion of NC plans during executive session of the Winter meeting provided this is requested either by the Chair of the NC or by the President, or a representative of the President. The NC chair shall be invited to attend for this item, expenses being borne by the AMS.

3. The NC chair or designated substitute shall attend Council in executive session at the Spring meeting for the discussion of the NC report, with expenses borne by the AMS.
4. The Secretary shall keep the NC informed of any nominations by petition which appear likely to receive the prescribed number of signatures.
5. The Secretary shall inform candidates for any office (including NC) of the duties and conditions of the office.
6. The briefing of the NC shall include the description of Council policies on nomination.
7. The chair of the Nominating Committee shall be elected by the NC from among its second-year members.

A Special Committee considered procedures for the Committee on Professional Ethics and presented them to the Council. The Council adopted them subject to review by Society counsel. The procedures are as follows:

Procedures for the Committee on Professional Ethics (COPE)

Historically, the job of COPE was to resolve conflicts between individuals (and/or organizations such as universities and journals). The following guidelines are intended for dealing with such problems. It should not be thought, however, that COPE is limited to conflict resolution or that the AMS has no interest in professional ethics beyond peace-keeping operations. We are in a time when the concepts of ethical behavior are widening and professional societies are expected to take note of these new responsibilities. Issues of the proper relation of mathematicians and the AMS to society may be expected to loom ever

larger. For this reason COPE should feel free, indeed obliged, to consider from time to time ethical matters that go beyond interpersonal conflict and to make appropriate recommendations to the AMS Council. Such considerations may be initiated by others or by COPE itself. COPE, however, is not empowered to speak publicly in the name of the AMS.

COPE shall be a committee of six members representing a broad spectrum of membership of the Society. They shall be appointed by a vote of the Council with the advice of the Committee on Committees, and have three-year, staggered terms. The chair of COPE shall be elected by the committee. The committee normally is to conduct business via conference calls, mail, and e-mail. COPE, however, is encouraged to meet at least once each year (normally at the annual meeting) to review its activities or conduct ongoing business.

Outlined below are recommended procedures for resolution of conflict. The committee may deviate from these procedures as cases warrant and parties agree, but COPE is encouraged to follow standardized procedures in the interest of perceived fairness. Indeed, it is of great importance to the AMS that COPE act impartially, both in fact and in appearance. Modification of these procedures is expected to occur as experience is gained, and the Council shall entertain such suggested modifications.

1. COPE receives an inquiry from a member of the Society concerning professional ethics. The chair of COPE makes an informal inquiry, taking no more than several weeks. The committee then determines if the case should be handled by an ombudsperson or should proceed directly to an investigation.
2. In case reconciliation seems possible the chair selects a member of the committee to act as ombudsperson for that case. The chair and the ombudsperson shall agree on a time limit for this procedure (this will depend on the parties involved, time of year, and other circumstances). At the end of this period, or any mutually agreed upon extension, the ombudsperson

shall report on the solution of the issue to COPE or recommend that the case be investigated formally by COPE.

3. In case a formal investigation is called for the chair, on the advice of the committee and after consultation with the President of the Society, shall appoint a three-member special committee for the case. Any party to the case may submit to the chair of COPE a list of Society members whom they wish not to serve on the special committee. Any party may request certain peer representation on the special committee, e.g., a nontenured member if a party is also nontenured. The chair of COPE shall take these suggestions under advisement. The special committee shall generally be knowledgeable of the area of conflict. A time limit for the special investigation will be agreed to by all parties, with COPE making the final determination of a reasonable time limit in case of nonagreement of the principal parties. Any party may ask for an extension of the time limit from COPE as the case proceeds.
4. The special committee shall gather facts and statements from all interested parties. Except in the rare cases noted below, the committee shall keep minutes of all conversations involving the parties to the case, and any person interviewed by the committee shall be fully apprised that parties to the conflict shall be aware of their identity and statements. The special committee's discussions and deliberations as well as discussions with the chair of COPE need not be reported. All paper and electronic correspondence shall be kept. After any discussions or interview sessions involving parties to the case, all parties shall have the opportunity to see and comment on the recorded minutes. In rare cases the committee might decide it necessary to obtain confidential material or assure the confidentiality of a source. In these circumstances the material and/or source shall not

be used as sole or primary material in rendering any decision.

5. After completing what it determines to be a full investigation, and after all parties have been asked to comment on the accuracy and completeness of the record, the committee shall present a written report to COPE; such report shall be presented within the allotted time. In case parties disagree on statements of facts, that, too, shall constitute a part of the report. In case it is not possible to reach agreement about the completeness of the record and the committee feels a stalemate has been reached, the committee may issue a report anyway, provided the disagreement is clearly stated in the report.
6. This report shall consist of a copy of the complete record and the special committee's determination of belief in case of conflicting material or claims. The special committee shall recommend to COPE action to reprimand any party or parties or steps to correct any action or inaction. All parties to the dispute shall be given copies of the special committee report. COPE and any special committee COPE establishes to investigate any case shall have access to AMS legal counsel for advice. AMS legal staff shall review the final report of any special committee and any final determination and recommendation of any case that goes through a special committee procedure.
7. COPE shall take the special committee's recommendations under advisement and make a recommendation to the AMS Council within a reasonable time. COPE shall take into consideration the precedents for any recommendations. COPE may modify the recommended action or actions of the special committee; however, if COPE intends to modify the recommendations of the special committee, it shall confer with the special committee on the final recommendations.
8. COPE shall issue a summary re-

port on any completed case to the Council. This report may include the complete special committee report in an unusually difficult case. If no Council meeting is scheduled to be held within two months of COPE's report, the Secretary of the Society shall circulate the report to the Council straightaway with a view to possible action by mail. The Council shall act on the recommendation of COPE as it deems appropriate. In any event rapid action by the Council is essential.

9. Appeal of any case shall be made only to the Council. Notice of intent to appeal shall be made within three months of the Council's action. The appeal shall be made only with cause and shall be made in writing to the Secretary of the Society within six months of the Council's action. No case for which a special committee was activated by COPE and a final determination was made shall be reheard by COPE unless COPE or the Council determines that substantial new material has surfaced. After possible appeal, it is ultimately the Council that must make the final determination on any cases brought to COPE. The Council shall act on the appeal at its next meeting after receipt of the appeal.

10. There is no particular binding effect of a Council recommendation on any party, insofar as the AMS shall not be expected to proceed with legal action.

COPE and its special committees shall be indemnified under Article XIII of the AMS Bylaws.

Responding to a question as to when Vice-Presidents of the Society "officially" represent the Society in the absence of the President, President Artin appointed a special committee that reported to the ECBT and to this Council. The Council referred the question to the LRPC and asked it to report to the May 1993 ECBT.

A Special Subcommittee of the Committee on Committees on the Committee Structure reported to the Council.

The main recommendation was to establish standing policy committees in five areas—science policy, education, publication, the profession, and meetings and conferences—with the currently existing Committee on Science Policy and Committee on Education as two of the five. Other recommendations concerned the charges to the committees, the membership of the committees, and several other committee housekeeping recommendations.

After some amendments the Council adopted the following:

Recommendation 1: Policy committees shall be established in the areas of science policy, education, publication, meetings and conferences, and the profession. Each policy committee will be expected to provide major direction for Society activities in its area. The Committee on Science Policy and the Committee on Education (COE) shall assume the role of policy committees in their areas, while new committees shall be created to play this role in each of the other three areas.

Recommendation 2: The charge to the policy committees shall include:

- to provide advice to the leadership of the Society and make recommendations as to Society policy,
- to be responsible for taking a long-range view in their areas,
- to conduct an annual high-level review of activities and structures within their areas and evaluate progress toward Society goals,
- to report regularly to the membership, both in writing and by presentations at meetings,
- to maintain communication with the membership and awareness of their views, and

- to coordinate with other professional organizations.

CSP and COE already have charges, and these responsibilities, similar to what they have now, should be added to their charges. Each policy committee shall write its own specific charge, which shall be submitted to the Council for approval.

Amended Recommendation 3: The membership of each policy committee shall be:

- three Council members, chosen from among the Vice-Presidents and Members-at-Large of the Council;
- a member of the Board of Trustees;
- the President of the Society;
- the Executive Director of the Society, who shall be a voting member of the Committee on Science Policy (CSP) and Committee on Education (COE) and a non-voting member of the Committees on Publication, The Profession, and Meetings and Conferences;
- the Secretary of the Society, who shall be a voting member of the Committee on The Profession and the Committee on Meetings and Conferences and a nonvoting member of the Committees on Science Policy, Education, and Publication;
- four to six at-large members.
- In addition, the President-Elect/Ex-President and the Council representative to the JPBM shall serve on CSP, there shall be an MAA appointee on COE, and the chair of CSP shall serve on COE, and vice-versa. (These all reflect current practice.) Also a member of the Editorial Boards Committee shall

serve on the Publication policy committee.

With the exceptions noted above, these shall all be regular voting members of the respective policy committees and shall all serve three-year terms, which shall be staggered. The chair of each policy committee will be appointed to a one-year term as chair with the possibility of extension, extending his/her term on the policy committee if necessary.

An appropriate executive-level staff member (who may vote in the absence of the Executive Director when the Executive Director has voting privileges) shall attend the meetings of each policy committee as well as provide administrative and staff support. The Meetings and Conferences policy committee shall invite the Associate Secretaries to attend its meetings.

The membership of CSP and COE shall gradually be changed to conform with the above.

Recommendation 4: The President shall appoint the members of the policy committees, except for the Board member, who shall be appointed by the Chair of the Board of Trustees.

Recommendation 5: We recommend to the Board of Trustees that the President and Ex-President/President-Elect be *ex officio* members of the Long-Range Planning Committee (LRPC) and that the LRPC consider whether it wishes to have the policy committee chairs as members or invite them to attend (relevant) meetings of the LRPC. This recommendation passed.

Recommendation 6: We recommend that the Council move to abolish the Committee to Monitor Problems in Communication.

Recommendation 7: An "Edito-

rial Committee for Books Not in Series" shall be created.

Recommendation 8: When offered committee appointments or nominated for election to the Council, volunteers shall be adequately informed of the commitment involved in their prospective service.

Recommendation 9: The Council should rely more on its committees. It should routinely use its committees to study complicated issues facing the Society, and committees should make detailed recommendations to the Council accompanied by analysis of such issues. A committee representative should be present at Council meetings when it is anticipated that this will significantly assist the Council in its deliberations.

Recommendation 10: A mechanism shall be established to review regularly the committees of the Society and recommend discharge or merger of committees when appropriate. (Perhaps this might be done by the Secretary and the Committee on Committees.)

Recommendation 11: A study of relevant organizational issues, including questions related to the composition of the Council, shall be undertaken.

Recommendation 12: A general review of the policy committee structure and operations shall be undertaken in three to four years.

The September 1992 Council passed a resolution on publication policy. Portions of the resolution concerned copyright policy. The President appointed a special committee of the ECBT consisting of Council member Axler, Trustee Montgomery (chair), Associate Executive Director Rankin, and Director of Marketing Soldevilla to report on the financial and legal implications that implementation of this policy would have. The report of this committee can be found in the AMS Committee Report

Book for 1993, Report No. 930101-06. In addition Montgomery provided the Council with an oral report.

The special committee requested that its recommendation

That the current AMS copyright agreement be amended by adding the sentence

"The author has permission to make copies of the article, provided it is noncommercial copying for education or research purposes only".

For the time being, however, we feel that a conservative approach would be best, and that includes keeping copyrights on what we publish.

be placed on the agenda for the April 1993 Council meeting.

Council members Baouendi, Fossum, Jaffe, Lieb, and Yau submitted additional resolutions for consideration by the Council. These resolutions failed.

The Joint Meetings were scheduled to be held in Denver, Colorado, in January 1995. Recently voters in Colorado approved an amendment to the state constitution that prohibits the inclusion of sexual orientation in state and municipal antidiscrimination clauses. It had been proposed by several members of the Council that the Society should not meet in Colorado as scheduled.

The Council dissolved into the Committee of the Whole, met together with a similarly consisted committee of the MAA Board of Governors, and reported a resolution for consideration by the Council. The resolution

The Council of the AMS believes that the actions taken by the majority of those voting in Colorado in November 1992 with respect to discrimination against homosexuals were wrong. The Council of the AMS recommends that the Joint Meetings not take place in Colorado while language similar to that in Amendment 2 of the November 1992 General Election passed by the voters of Colorado remains in the Colorado constitu-

tion. One of the reasons for this resolution is that the AMS has the duty to protect all participants at their meetings from possible discrimination.

The Council of the AMS delegates the responsibility for final action to the AMS Board of Trustees and the MAA Executive and Finance Committee, who will instruct the Joint Meetings Committee to make every effort to find a site for the January 1995 meeting in a state other than Colorado.

The Council of the AMS requests that the sentiments of this resolution be communicated to the Governor of Colorado.

was approved by the Council.

The Society administers a fund to aid mathematicians in the former Soviet Union (fSU) called the Former Soviet Union Aid Fund.

After some discussion the Council passed the

Resolution

The American Mathematical Society adheres strongly to the principle that grants awarded to individuals under the AMS fSU Aid Fund will be made without discrimination as regards race, religion, ethnic origins, gender, sexual preference, political persuasion, or age. The Society will make every possible effort to become informed as to instances when such considerations could arise and to insure that they do not influence the applications procedures or peer review or the distribution of grant funds.

It also passed the

Resolution

The Society will establish a mechanism to monitor the way aid administered by the AMS to formerly Soviet Union mathematicians (fSUM) is being used. Every six months the Executive Director (ED) will report on the aid provided to fSUM. Continuation of

the program will be contingent on the ED's verification that the program is operating in accordance with AMS policy guidelines.

And it passed the

Resolution

The Council of the American Mathematical Society expresses its condemnation of the anti-Semitic writings of I. R. Shafarevich as expressed in *Russophobia*. Dr. Shafarevich has used his highly respected position as an eminent mathematician to give special weight to his words of hatred, which are contrary to fundamental standards of human decency and to the spirit of mathematics and science.

A motion for the Business Meeting proposing a Resolution on Departmental Examinations, proposed by Robert O. Stanton, that had been submitted to the Committee on the Agenda for Business Meetings for the January 1992 Business Meeting was presented at that meeting. The resolution reads as follows:

A Resolution on Departmental Examinations

Whereas:

- (1) Departmental examinations can discourage innovative teaching techniques and impede advances in education.
- (2) Students for whom English is a second language are frequently put at an unfair disadvantage because of unfamiliar phrasing of the questions on a departmental examination.
- (3) Because of different emphases, levels of preparation, styles of instruction, etc., departmental examinations do not fulfill the goal of a uniform measure of ability for different sections of the same course.
- (4) Any individual who is regarded as sufficiently competent to be entrusted with the day-to-day teach-

ing of a course should a fortiori be considered capable of creating appropriate examinations and grading systems.

be it resolved that:

The American Mathematical Society considers it a principle of academic freedom that all individuals teaching university mathematics courses shall have the right to prepare their own examinations and to set their own grading scales.

This resolution had been referred by the January 1992 Business Meeting to the Committee on Education. The Committee on Education in turn reported as follows:

The Committee on Education discussed [the resolution] at its meeting of April 5, 1992. The Committee feels that there are cogent arguments on both sides of the "uniform examination" issue and that both sets of arguments are consistent with the principles of academic freedom. Therefore, it would be unwise for the American Mathematical Society to adopt the proposed resolution.

Accordingly, the Committee on Education recommends that you vote AGAINST this motion.

The Council agreed to place this resolution on the agenda for the Business Meeting of the Society that was to be held on 15 January 1993 and to endorse the Society's Committee on Education position.

Professor Saunders Mac Lane proposed the following motion for consideration at the same Business Meeting in San Antonio:

Resolved:

That the AMS Strategic and Operating Plan be withdrawn for reconsideration; in particular, for inclusion in the plan of major attention to the support and encouragement of mathematical research.

This resolution was received within

the stated deadline for receipt of agenda items for the Business Meeting and has been considered by the Committee on the Agenda for Business Meetings. This Committee recommended a format for debate on the issue that was to be suggested to the Business Meeting. It also recommended that the resolution be referred to a committee (after the

debate). Professor Mac Lane wrote a position paper that was attached to the agenda.

The Council agreed to place **discussion** of the Mac Lane resolution on the agenda for the January 1993 Business Meeting and recommended that the Business Meeting refer the resolution to the Long-Range Planning Committee

for further consideration and referral to a future Business Meeting.

The Council adjourned at about 11:30 p.m.

Respectfully submitted,

Robert M. Fossum
Secretary
Urbana, Illinois

Miscellaneous

Personals

Charles M. Chambers, president of the American Foundation for Biological Sciences, will become president of Lawrence Technological University July 1, 1993.

Alfred W. Hales, of the University of California at Los Angeles, has been appointed Director of IDA's Center for Communications Research in San Diego, California.

T. Benny Rushing, of the University of Utah, was appointed Dean of the College of Science at that institution.

Deaths

Frank V. Chorley, of Cheltenham Glos, England, died on January 9, 1993, at the age of 73. He was a member of the Society for 1 year.

Theodore M. Edison, of West Orange, New Jersey, died on November 25, 1992, at the age of 94. He was a member of the Society for 64 years.

James Wallace Givens, of El Cerrito, California, died on March 5, 1993, at the age of 82. He was a member of the Society for 56 years.

Ruth Stauffer McKee, of Newtown, Pennsylvania, died on January 9,

1993, at the age of 82. She was a member of the Society for 57 years.

Thomas H. Southard, a Professor Emeritus from Sequim, Washington, died on January 14, 1993, at the age of 81. He was a member of the Society for 52 years.

Gerard van der Maas, of Nepean, Ontario, died on January 24, 1993, at the age of 76. He was a member of the Society for 32 years.

M. A. Zorn, Professor Emeritus of Indiana University, died on March 9, 1993, at the age of 86. He was a member of the Society for 58 years.

Visiting Mathematicians

The list of visiting mathematicians includes both foreign mathematicians visiting in the United States and Canada, and Americans visiting abroad. Note that there are two separate lists.

American Mathematicians Visiting Abroad

<u>Name and Home Country</u>	<u>Host Institution</u>	<u>Field of Special Interest</u>	<u>Period of Visit</u>
Pierce, Donald A. (U.S.A.)	Radiation Effects Research Foundation (RERF), Japan	Cancer Research	10/92 – 10/94
Protter, Philip (U.S.A.)	University of Paris I, France INRIA, Sophia Antipolis, France	Probability Probability	6/93 7/93
Stephenson, John (Canada)	University of Western Australia, Australia University of Hull, England	Numerical Analysis Numerical Analysis	10/93 – 3/94 4/94 – 5/94
Wilkerson, Clarence (U.S.A.)	Mittag-Leffler Institute, Sweden	Algebraic Topology	10/93 – 11/93

Visiting Foreign Mathematicians

Bian, Fuping (China)	Florida State University	Mathematical Modeling	1/93 – 1/94
Gu, Pei (China)	Purdue University	Lie Groups	8/93 – 7/94
Gulisashvili, Archil (Republic of Georgia)	Boston University	Analysis, Signal Processing, and Wavelets	1/93 – 6/93
Hajnal, Andras (Hungary)	University of Calgary	Set Theory, Graph Theory, and Logic	8/93 – 8/94
Huang, I.-C. (Taiwan)	Purdue University	Algebraic Geometry	5/93 – 7/93
Isogawa, Yoshiko (Japan)	Iowa State University	Measurement Errors	9/93 – 8/94
Kawamura, Kazuhiro (Japan)	University of Saskatchewan	Topology	8/92 – 8/94
Kim, Jung Il (Korea)	Oregon State University	Linear Models	2/93 – 2/94
Kwon, Kil (Korea)	Utah State University	Function Analysis	9/92 – 6/93
Langlais, Michel (France)	Purdue University	Partial Differential Equations	9/93
Lefmann, Hanno (Germany)	University of Idaho	Combinatorics	1/93 – 6/93
Luczak, Tomasz (Poland)	Emory University	Probability, Discrete Mathematics	1/94 – 5/94
Pintz, János (Hungary)	Brigham Young University	Number Theory	1/94 – 4/94
Rama-Murthy, Kavi (India)	University of Tennessee	Probability	8/93 – 7/94
Rips, Elyahu (Israel)	Columbia University	Group Theory	1/94 – 5/94
Rucinski, Andrzej (Poland)	Emory University	Probability Theory and Discrete Mathematics	9/93 – 12/93
Ryznar, Michal (Poland)	Michigan State University	Probability and Stochastic Processes	8/93 – 5/94
Schwarz, Gunther (Germany)	University of Calgary	Boundary Value Problems in Mathematical Physics, Hodge Theory	8/92 – 8/93
Skorokhod, Anatoli (Ukraine)	Michigan State University	Probability and Stochastic Processes	8/93 – 12/93
Surgailis, Donatas (Lithuania)	Michigan State University	Probability and Stochastic Processes	1/94 – 5/94
Turbiner, Alexander (Russia)	Case Western Reserve University	Partial Differential Equations	5/93 – 1/94
Umeda, Tomio (Japan)	University of Alabama at Birmingham	Mathematical Physics, Field Theory, and Dirac Operators	10/92 – 8/93
Yu, Dahai (China)	Purdue University	Operator Theory	5/93 – 4/94

New Members of the AMS

ORDINARY MEMBERS

- Karlen Aram Abgaryanb, Moscow, Rep of Russia
- Tinouye M Adeniran, Moi Univ, Eldoret, Kenya
- Andrei Aleksandrovich Agrachev, Steklov Institute of Mathematics, Moscow, Rep of Russia
- Abdulla M Al-Jarrah, Yarmouk Univ, Irbid, Jordan
- Hugo R Alarcon, Pontificia Univ Catolica, Santiago, Chile
- Vaggelis I Alexopoulos, Athens, Greece
- Rosihan M Ali, Univ Sains Malaysia, Penang
- Viktor Kirilov Andonov, Sofia, Bulgaria
- Tengku Andri, Medan, Indonesia
- Michael S Anoussis, Univ of the Aegean, Samos, Greece
- Henryk Stanistaw Arodz, Jagellonian Univ, Krakow, Poland
- Carlos Arteaga, Univ Federal de Sao Carlos, Brazil
- Evgenios P Avgerinos, Univ of the Aegean, Samos, Greece
- Edward R Avila, Lancaster, CA
- Thomas Yakovlevich Azizov, Voronezh, Rep of Russia
- Jerzy K Baksalary, Tadeusz Kotarbinski Pedagogical Univ, Zielona Gora, Poland
- Katalin Balla, Hungarian Academy of Science, Budapest
- Shirin R Bar-Sela, Houston, TX
- George M Barnwell, Univ of Texas at San Antonio
- Charlton B Barreto, Fremont, CA
- Maher Wagdi Barsoum, San Diego, CA
- Rana Barua, Indian Statistical Institute, Calcutta, India
- Ewa Bednarczuk, Polish Academy of Sciences, Warsaw
- S Bhargava, Mysore, India
- B V Rajarama Bhat, Indian Statistical Institute, New Delhi
- Yuri Igorevich Biba, Turboservice Limited, Lodz, Poland
- Ayse Humeyra Bilge, Tubitak, Kocaeli, Turkey
- Tatiana Yurievna Bilgildeeva, St Petersburg, Rep of Russia
- C Anders G Bjorn, Linkoping, Sweden
- Pavel Petrovich Bocharov, P L People's Friendship Univ, Moscow, Rep of Russia
- Alexander A Bondarenko, Univ Gorodok, Minsk, Rep of Byelorussia
- Huseyin Bor, Erciyes Univ, Kayseri, Turkey
- Natalia Borisovna, Chelyabinsk State Univ, Rep of Russia
- Szczepan Borkowski, Gliwice, Poland
- O V Borodin, Russian Academy of Sciences, Novosibirsk, Rep of Russia
- Abdelkader Boucherif, Georgia Institue of Technology, Atlanta
- Andreas G Boudouvis, National Technical Univ of Athens, Greece
- Luke F Bow, Jackson Heights, NY
- Mikhail Sh Braverman, Computer Center, Khabarovsk, Rep of Russia
- Andrew Bremner, Arizona State Univ, Tempe
- Michail Davidovich Bronshtein, Kazan, Rep of Russia
- Frank Bullock, Univ of South Africa, Pretoria
- Haitao Cai, Central South Univ of Technology, Hunan, People's Republic of China
- Sui Lin Cai, Zhejiang Univ, Hangzhou, People's Republic of China
- Domingos M Cardoso, Univ of Aveiro, Portugal
- Stefan Chanas, Technical Univ, Wroclaw, Poland
- Hoi-Fung Chau, Univ of Illinois, Urbana
- Vladimir I Chebotarev, Computer Center, Khabarovsk, Rep of Russia
- Gong-ning Chen, Beijing Normal Univ, People's Republic of China
- Zhi-Min Chen, Tianjin Univ, People's Republic of China
- Zhonghu Chen, Xingtian Univ, People's Republic of China
- Fuchang Cheng, Guangxi Teachers Univ, Guilin, People's Republic of China
- Evgeney V Cheremnikh, Lvov, Rep of Ukraine
- Nickolai Sergeevich Chernikov, Academy of Sciences of the Ukraine, Kiev, Rep of Ukraine
- Olga Sergeevna Chernikova, Ukrainian Academy of Sciences, Kiev, Rep of Ukraine
- Arkadi Alexandrovich Chernyak, Academy of Sciences of Belarus, Minsk, Rep of Byelorussia
- Alexander Chigogidze, Winnipeg, Manitoba Canada
- Ivan Delchev Chipchakov, Bulgarian Academy of Sciences, Sofia
- Yeol Je Cho, Gyeongsang National Univ, Jinju, Korea
- John R Christie, Flinders Univ, Adelaide, Australia
- Chong Suh Chun, Athabasca Univ, Alberta Canada
- In-Jae Chung, Seoul, Korea
- Dean Chupik, Houston, TX
- Stuart Citrin, Woodmere, NY
- Manuel Clementino, Univ of Coimbra, Portugal
- Simon S Clift, Waterloo, Ontario Canada
- Thomas M Conlon, Leesburg, VA
- Cristian N Costinescu, Bucharest, Romania
- Bao Tong Cui, Binzhou Normal Univ, People's Republic of China
- Hai-Yan Cui, Shanghai, People's Republic of China
- Ming Gen Cui, Harbin Institute of Technology, People's Republic of China
- Jerzy Czyz, Eastern Montana College, Billings
- Eugenii Georgievich D'yakonov, Moscow State Univ, Rep of Russia
- Luiz Fernando Da Rocha, Porto Alegre, Brazil
- Alexandre Ivanovich Danilenko, Kharkov State Univ, Rep of Ukraine
- Stanislav N Danov, Shoumen, Bulgaria
- Elena De Oteyza, Univ Nacional Autonoma de Mexico
- Han Deguang, Qufu Normal Univ, People's Republic of China
- Jose Luis Diaz Gomez, Sonora, Mexico
- Martha Dickinson, Olympia, WA
- Georgi Dobromirov Dimov, Sofia, Bulgaria
- Er Sheng Ding, Beijing Normal Univ, People's Republic of China
- Eid Hassan Doha, Jeddah, Saudi Arabia
- Alexandru Donescu, Bucharest, Romania
- Charles F Doty, Ridley Park, PA
- Alexander Nikolaevich Dranishnikov, Cornell Univ, Ithaca, NY
- Haibao Duan, Peking Univ, Beijing, People's Republic of China
- Vladimir N Dubinin, Russian Academy of Sciences, Vladivostok, Rep of Russia
- Mohamed El Hatri, Ecole Superior of Technology, Fes, Morocco
- Mohamed Aly El-Sayed, Cairo Univ, Giza, Egypt
- Dieter P Eppel, GKSS Research Center, Geestacht, Germany
- Svetlana Eremenko, Medford, MA
- Henryk Fast, Wayne State Univ, Detroit, MI
- Miloslav Feistauer, Charles Univ, Prague, Czechoslovakia
- Olga J Fernandes, Poona, India
- Miguel Ferrero, Univ Federal do Rio Grande, Porto Alegre, Brazil
- Benedito Tadeu V Freire, Natal, Brazil
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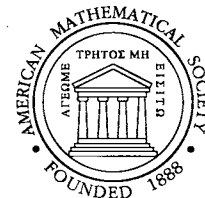
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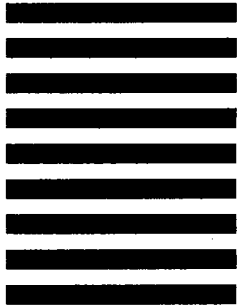
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Preregistration/Hotel Form, Vancouver, Canada
International Joint Mathematics Meetings
 August 15-19, 1993

Based on form of payment, please complete this form and return to:

In U.S. Funds: Mathematics Meetings Service Bureau (MMSB)
 P. O. Box 6887
 Providence, Rhode Island 02940 U.S.A.
 401-455-4143

In Canadian Funds: CMS Executive Office
 577 King Edward, Suite 109
 P. O. Box 450, Station A
 Ottawa, Ontario, Canada K1N 6N5
 613-564-2223

DEADLINES

Ordinary Preregistration (including tickets) June 11, 1993
 Hotel Reservations through MMSB June 11, 1993
 Final Preregistration (no hotel or tickets) July 19, 1993
 Hotel Changes/Cancellations through MMSB* July 1, 1993
 50% Refund on Banquets & Tours* August 2, 1993
 (no refunds after this date)
 50% Refund on Joint Meetings Preregistration* August 11, 1993
 (no refunds after this date)

*Cancellations and/or changes to preregistration, tickets, and reservations at the Holiday Inn must be made through the MMSB, regardless of where the original payment was sent.

REGISTRATION FEES

JOINT MATHEMATICS MEETINGS		Preregistration by July 19, 1993	
		US\$	CDN\$
Member of AMS, CMS, MAA, IIME		135	165
* Emeritus Member of AMS or MAA and Retired CMS		35	43
* Nonmember		210	256
* Students:			
High School		2	2
Graduate or Undergraduate		35	43
* High School Teachers or Librarians		30	37
* Unemployed		35	43

(N.B.: A separate form appears in this issue for preregistration for MAA Minicourses)

* See the section on "How to Preregister".

PREREGISTRATION SECTION:

1) _____ Telephone: _____
 (Please print) Surname First Middle

2) _____ (e-mail address)
 (Mailing address)

I do not wish my badge and program to be mailed; however, the mailing address for my acknowledgment is given above.

3) Badge information: Affiliation _____ MR Classification # _____

4) Member of AMS CMS MAA IIME Nonmember Member of other organizations: AWM NAM

5) Students: Grad Undergrad High School 6) Emeritus/CMS Retired member Unemployed Librarian High School Teacher

7) Joint Meetings fee US\$ _____ CDN\$ _____ 8) Hotel Deposit (if applicable) US\$ _____ CDN\$ _____

9) Subtotal of Payments for Social Events (see other side) US\$ _____ CDN\$ _____

10) **Total amount enclosed for 4 through 9** US\$ _____ CDN\$ _____ **Method of Payment:** Credit Card (Visa or MasterCard only)
 Purchase Order (original institutional PO attached) Check (payable to AMS or CMS)

Credit card type: _____ Card number: _____ Expiration date: _____

If this is your credit card, please print your name as it appears on the credit card on the line below and sign your name.

If this is not your credit card, please print card holder's name as it appears on the credit card on the line below and have the card holder sign:

See reverse for registration for social events and/or hotel reservations.

For office use only:

Codes:	Options:	Hotel:	Room type:
_____	_____	_____	_____
Dates:	Hotel Deposit	Total Amt. Paid:	
_____	_____	_____	
Special Remarks:			

SOCIAL EVENTS SECTION:

Opening Banquet:	_____ tkts @ US\$27/CDN\$33 each =	US\$ _____ CDN\$ _____	Vegetarian	<input type="checkbox"/>	Kosher	<input type="checkbox"/>
Salmon Barbecue:	_____ adult tkts @ US\$27/CDN\$33 each =	US\$ _____ CDN\$ _____	Vegetarian	<input type="checkbox"/>	Kosher	<input type="checkbox"/>
	_____ children tkts @ US\$13.50/CDN\$16.50 each = (10 years & under)	US\$ _____ CDN\$ _____	Vegetarian	<input type="checkbox"/>	Kosher	<input type="checkbox"/>
Children's Reception:	_____ children @ US\$5/CDN\$6 per child =	US\$ _____ CDN\$ _____				
MAA 25-Year Banquet:	_____ tkts @ US\$26/CDN\$31.50 each =	US\$ _____ CDN\$ _____	Vegetarian	<input type="checkbox"/>	Kosher	<input type="checkbox"/>
IIME Banquet:	_____ tkts @ US\$12/CDN\$14.50 each =	US\$ _____ CDN\$ _____	Vegetarian	<input type="checkbox"/>		
	_____ IIME member tkts @ US\$8/CDN\$10 each =	US\$ _____ CDN\$ _____	Vegetarian	<input type="checkbox"/>		
City Tour:	_____ adult tkts @ US\$24/CDN\$29 each =	US\$ _____ CDN\$ _____	8/15 Tour	<input type="checkbox"/>	8/17 Tour	<input type="checkbox"/>
	_____ children* tkts @ US\$14/CDN\$17 each =	US\$ _____ CDN\$ _____	8/15 Tour	<input type="checkbox"/>	8/17 Tour	<input type="checkbox"/>
North Shore Tour:	_____ adult tkts @ US\$36/CDN\$43.50 each =	US\$ _____ CDN\$ _____	8/16 Tour	<input type="checkbox"/>	8/18 Tour	<input type="checkbox"/>
	_____ children* tkts @ US\$21/CDN\$25.50 each =	US\$ _____ CDN\$ _____	8/16 Tour	<input type="checkbox"/>	8/18 Tour	<input type="checkbox"/>
Victoria Tour:	_____ adult tkts @ US\$61.50/CDN\$75 each =	US\$ _____ CDN\$ _____				
	_____ children* tkts @ US\$33/CDN\$40 each =	US\$ _____ CDN\$ _____				
Whistler Tour:	_____ adult tkts @ US\$36/CDN\$44 each =	US\$ _____ CDN\$ _____				
	_____ children* tkts @ US\$17.50/CDN\$21 each =	US\$ _____ CDN\$ _____				
Steam Train/Boat Tour:	_____ adult tkts @ US\$50.50/CDN\$61.50 each =	US\$ _____ CDN\$ _____				
	_____ seniors/youths* tkts @ US\$43.50/CDN\$53 each =	US\$ _____ CDN\$ _____				
	_____ children* tkts @ US\$19/CDN\$23 each =	US\$ _____ CDN\$ _____				
Total enclosed for social events:		US\$ _____ CDN\$ _____				

(Enter this amount in item #9 on the reverse side of this form)

*Where indicated, children's fares apply to those aged 12 years and under. For the Steam Train/Boat Tour, senior/youth fares apply to those aged 12 to 18 years, or 60+ years, children's fares apply to those aged 5 to 11 years, and there is no charge for children four years and under.

I plan to attend the Jeffery-Williams Reception on Tuesday, August 17. Number of people: _____

ACCOMMODATION SECTION:

For statistical purposes, please check one of the following:

- I will be residing on campus at UBC.
- I will make reservations at a local hotel/motel directly.
- I live in the area or will be staying privately with family or friends in the area.
- I will be sharing a room with someone who has made reservations at the Holiday Inn through the Service Bureau.

If you wish to make a reservation(s) at the Holiday Inn through the Service Bureau, please complete the information below. For further information on housing and instructions on how to get a room, see the section on "How to Get a Room".

Group rates quoted below are in Canadian funds and are subject to a 10% Provincial Rooms Tax and a 7% GST.

GUARANTEE REQUIREMENTS: US\$41/CDN\$50 by check, or supply your VISA, MasterCard, or American Express number on the reverse side of this form, together with mailing address for confirmation of room reservation.

Holiday Inn Vancouver Centre

Please circle room type requested: Single: CDN\$110 Double(one/two beds): CDN\$120 Triple: CDN\$130 Quad: CDN\$140

I will arrive on (date) _____ at _____ a.m./p.m., and depart on (date) _____ at _____ a.m./p.m.

Please list other room occupants

<u>FULL NAME</u>	<u>ARRIVAL DATE</u>	<u>DEPARTURE DATE</u>
------------------	---------------------	-----------------------

Please list any special requests below:

Additional Information

Name of Delegate: _____

Single Room (Shared Washroom Accommodation):

If you are planning to stay in a room with a shared washroom, please indicate here if you are:

Male or Female.

I wish to be adjacent to the following persons:

<u>Name</u>	<u>Relationship</u> spouse, child (indicate age), or colleague	<u>Sex</u> M or F
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____

Nonfamily members must send in their own request for accommodation forms.

Adjacent rooms cannot be guaranteed to delegates arriving or departing on different dates.

Special Housing Requests:

Delegates with special housing requests are urged to submit their accommodation forms to the Conference Centre as soon as possible.

If faxing, please remember to fax both sides of this form.

MAA Minicourse Preregistration Form, Vancouver, Canada

August 15-19, 1993

To register for MAA Minicourse(s), please complete THIS FORM or a PHOTOCOPY OF THIS FORM and return it with your payment to:

Minicourse Coordinator
 Mathematical Association of America
 1529 Eighteenth Street, N.W.
 Washington, DC 20036
 Telephone: 202-387-5200

(Please print) Surname _____ First _____ Middle _____ Telephone: _____

Street address _____ City _____ State _____ Zip _____

- Deadline for MAA Minicourse preregistration: June 11, 1993 (After this date, potential participants are encouraged to call the MAA headquarters at 800-331-1622 or 202-387-5200.)
- Deadline for cancellation in order to receive a 50% refund: August 2, 1993
- Each participant must fill out a separate Minicourse Preregistration form.
- Enrollment is limited to two Minicourses, subject to availability.
- Please complete the following and send both form and payment to the Minicourse Coordinator at the above address:

I would like to attend 1 Minicourse 2 Minicourses

Please enroll me in MAA Minicourse(s): #____ and #____

In order of preference, my alternatives are: #____ and #____

• PAYMENT

Check enclosed: US\$ _____

Credit card type: MasterCard Visa

Credit card # _____ Expiration date: _____

Your Employing Institution _____ Signature (as it appears on credit card) _____

Minicourse Number and Name

1. The Fibonacci and Catalan numbers
2. Teaching applied mathematics via *Maple*
3. Environmental modeling via the qualitative, visual, and computational
4. Implementing the Harvard calculus curriculum
5. Teaching finite mathematics to a large class of arts and education students
6. Combinatorial design theory
7. Lagrange multipliers
8. Earth algebra: College algebra with applications to environmental issues
9. Round-robin tournaments: an introduction
10. Iteration
11. Learning abstract algebra by programming in ISETL

Organized by

- Ralph P. Grimaldi
- Robert J. Lopez
- B. A. Fusaro
- Wayne Raskind
- J. Chris Fisher
- Eric Mendelsohn
- Edward J. Barbeau, Jr.
- Christopher Schaufele & Nancy E. Zumoff
- John W. Moon
- Ronald J. Lancaster
- Ed Dubinsky & Rina Zazkis

Fee

- US\$36
- US\$45
- US\$45
- US\$45
- US\$45
- US\$36
- US\$36
- US\$45
- US\$45
- US\$36
- US\$45

I plan on preregistering for the Vancouver, Canada meetings **ONLY** in order to attend the MAA Minicourse(s) indicated above. It is my understanding that, should the course(s) of my choice be filled, a full refund of the Vancouver meetings preregistration fee will be made.

TRANSLATIONS OF MATHEMATICAL MONOGRAPHS

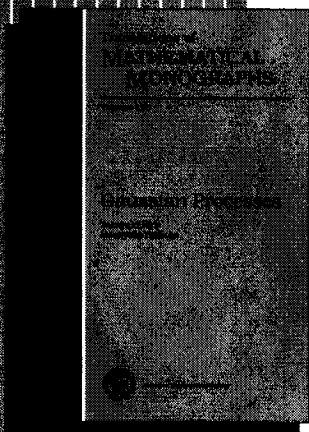


Nonlinear Poisson Brackets. Geometry and Quantization

M. V. Karasev and V. P. Maslov
Volume 119

This book deals with two old mathematical problems. The first is the problem of constructing an analog of a Lie group for general nonlinear Poisson brackets. The second is the quantization problem for such brackets in the semiclassical approximation (which is the problem of exact quantization for the simplest classes of brackets). The authors' main goal is to describe in detail the new objects that appear in the solution of these problems. Many ideas of algebra, modern differential geometry, algebraic topology, and operator theory are synthesized here. The authors prove all statements in detail, thus making the book accessible to graduate students.

1991 *Mathematics Subject Classification*: 58, 81; 16
ISBN 0-8218-4596-9, 366 pages (hardcover), April 1993
Individual member \$102, List price \$170, Institutional member \$136
To order, please specify MMONO/119NA

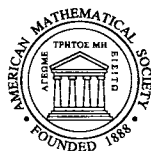


Gaussian Processes

Takeyuki Hida and Masuyuki Hitsuda
Volume 120

Aimed at students and researchers in mathematics, communications engineering, and economics, this book describes the probabilistic structure of a Gaussian process in terms of its canonical representation (or its innovation process). Multiple Markov properties of a Gaussian process and equivalence problems of Gaussian processes are clearly presented. The authors' approach is unique, involving causality in time evolution and information-theoretic aspects. Because the book is self-contained and only requires background in the fundamentals of probability theory and measure theory, it would be suitable as a textbook at the senior undergraduate or graduate level.

1991 *Mathematics Subject Classification*: 60
ISBN 0-8218-4568-3, 183 pages (hardcover), April 1993
Individual member \$59, List price \$99, Institutional member \$79
To order, please specify MMONO/120NA



All prices subject to change. Free shipment by surface; for air delivery, please add \$6.50 per title. *Prepayment required.* Order from: American Mathematical Society, P.O. Box 5904, Boston, MA 02206-5904, or call toll free 800-321-4AMS (321-4267) in the U.S. and Canada to charge with VISA or MasterCard. Residents of Canada, please include 7% GST.

INTERNATIONAL JOINT MATHEMATICS MEETING
AMS-DMV Meeting in Heidelberg, 1-3 October 1993
Preregistration Form

Please send your registration to:
Mathematisches Institut
Universität Heidelberg
INF 288
AMS-DMV Meeting
6900 Heidelberg 1
Germany

Preregistration deadline: 15 July 1993
Cancellation deadline (with 50% refund): 3 September 1993

Late forms will be accepted, but a **20 DM late fee charge** will be added to the registration fee.

(Please print) Surname _____

First _____

Middle _____

Address _____

Telephone _____ Fax _____

e-mail _____

Name Badge information: Affiliation _____

Day of Arrival _____ Day of Departure _____

Membership: AMS DMV Nonmember

Registration fee: 50 DM (AMS or DMV Members) 70 DM (Nonmembers)

Participation in **Conference Dinner** yes, with _____ person(s) (60 DM per person) no

Hotel reservation requested through Heidelberg Convention and Visitors Bureau: yes no

The total amount paid _____ (DM)

with Foreign draft (certified check in DM), enclosed

with credit card

Visa

MasterCard

Diners

EuroCard

Card number: _____ Expiration date: _____

(date)

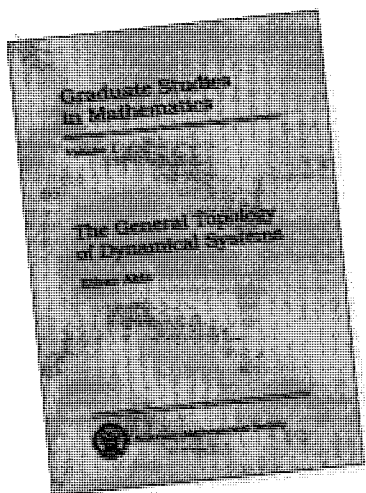
(print name)

(Signature)

If this is your credit card please print your name as it appears on the credit card on the line above and sign your name. If this is not your credit card please print card holder's name as it appears on the credit card and have the card holder sign.

Introducing...

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Volume 1

The General Topology of Dynamical Systems

Ethan Akin

- is an essential text for students studying dynamical systems and numerical analysis;
- contains straightforward proofs (guided by hints) for less-experienced readers;
- has over 60 exercises and 50 supplemental exercises;
- builds a natural foundation for all aspects of dynamical systems theory, using both old and new research;
- is a valuable reference tool for students and researchers alike.

60-day examination copy available

1991 *Mathematics Subject Classification*: 58, 34; **ISBN 0-8218-3800-8**, 261 pages (hardcover), 1993
List price \$50, Individual mem. \$30, Institutional mem. \$40. To order, please specify **GSM/1NA**



All prices subject to change. Free shipment by surface: for air delivery, please add \$6.50 per title.
Prepayment required. Order from: American Mathematical Society, P.O. Box 5904, Boston, MA 02206-5904, or call toll free 800-321-4AMS in the U.S. and Canada to charge with VISA or MasterCard.
Residents of Canada, please include 7% GST.

• **INTERNATIONAL JOINT MATHEMATICS MEETING** •
AMERICAN MATHEMATICAL SOCIETY – DEUTSCHE MATHEMATIKER-VEREINIGUNG
 OCTOBER 1–3, 1993

Heidelberg Congress Package
Hotel Reservation and Transportation Reservations

Please return to:

Karin Bendziula
 Manager, Marketing and Conventions
 Heidelberg Convention and Visitors Bureau
 Friedrich-Ebert-Anlage 2
 P. O. Box 10 58 60
 D-6900 Heidelberg 1
 Germany

Tel: 06221/10821 + 10823
 Fax: 06221/165108

Deadline for reservation: August 15, 1993

Last name/surname _____ First name _____ Title _____

Company/Institute _____

Street _____

City _____ State _____ Zip Code _____ Country _____

Telephone _____ Fax _____

I authorize the Convention and Visitors Bureau to make the following binding reservations and to debit the corresponding amounts in DM from the account below. **(Reservations will be accepted only upon receipt of payment.)**

1. Hotel Reservation (Please fill in the number of rooms desired in the space provided)

	Category	Single Room	Double Room	
A.	Deluxe-Hotel	___ DM 285 / 330	___ DM 365 / 430	I agree to a reservation in a hotel of another category if rooms in the originally desired category are not obtainable. yes <input type="checkbox"/> no <input type="checkbox"/> Upgrade: <input type="checkbox"/> Downgrade: <input type="checkbox"/>
B.	First Class	___ DM 190 / 240	___ DM 250 / 290	
C.	Comfort	___ DM 140 / 190	___ DM 180 / 230	
D.	Standard	___ DM 110 / 150	___ DM 150 / 180	
E.	Economy	___ DM 70 / 100	___ DM 110 / 140	

Date of arrival _____ Date of departure _____ = _____ night(s)

2. Airport Transfer

_____ a) Minibus by TLS (round trip: Frankfurt — Hotel in Heidelberg — Frankfurt) DM 80.-- / person.

_____ b) Lufthansa Airport Bus (round trip: Frankfurt — Penta Hotel only — Frankfurt) DM 60.-- / person.

Arrival on: _____ at _____ o'clock, flight no. _____, from _____

Departure on: _____ at _____ o'clock, flight no. _____, from _____

3. Local transportation and cable car ticket

_____ Ticket(s) for _____ days at the price of DM 5 /person/day = _____ DM

4. Railway Return Ticket

This can be booked only in conjunction with a hotel reservation. Please refer to the listing on the reverse of this form. Prices include the extra charges for Intercity or ICE trains. The transfer from your residence to the nearest (Intercity) railway station cannot be organized by our office.

_____ Tickets from/to _____ 1st class _____ 2nd class

FORM MUST BE COMPLETED ON THE REVERSE AND MUST INCLUDE SIGNATURE

Tickets are round trip to Heidelberg from the following cities: (All prices are in DM)

Return Ticket	2./1. Class	Return Ticket	2./1. Class
Aachen via Köln	141 / 207	Köln	117 / 171
Aschaffenburg	51 / 72	Konstanz	126 / 183
Augsburg (by ICE)	120 / 176	Krefeld	138 / 201
Baden-Baden	48 / 69	Leipzig	147 / 216
Basel (by ICE)	113 / 169	Lübeck	246 / 357
Berlin	225 / 330	Magdeburg	195 / 288
Bielefeld	189 / 279	Mainz (by ICE)	48 / 65
Bochum	150 / 222	Mönchengladbach	135 / 198
Bonn	105 / 153	Munich (by ICE)	142 / 232
Braunschweig	192 / 282	Münster	177 / 261
Bremen (by ICE)	231 / 350	Nuremburg	
Bremerhaven via Bremen	228 / 336	- via Frankfurt (by ICE)	146 / 211
Dortmund	159 / 234	- via Neckar Valley	108 / 159
Dresden via Frankfurt	174 / 255	Offenburg	60 / 87
Duisburg	141 / 207	Oldenburg via Bremen	222 / 327
Düsseldorf	132 / 195	Osnabrück	192 / 282
Essen	144 / 210	Potsdam	219 / 321
Flensburg via Hamburg	288 / 428	Regensburg via Nuremburg	171 / 252
Frankfurt/Main	48 / 69	Rostock via Frankfurt	276 / 408
Freiburg (by ICE)	89 / 131	Saarbrücken	69 / 99
Fulda (by ICE)	100 / 139	Salzburg via München	192 / 282
Göttingen (by ICE)	85 / 115	Schwerin via Hamburg	264 / 390
Hagen	144 / 210	Stuttgart (by ICE)	62 / 96
Hamburg (by ICE)	248 / 366	Trier	120 / 174
Hamm	168 / 246	Ulm (by ICE)	88 / 136
Hannover	198 / 295	Westerland via Hamburg	311 / 459
Kassel (by ICE)	134 / 188	Wiesbaden (by ICE)	48 / 69
Kiel via Hamburg	267 / 393	Wuppertal	132 / 195
Koblenz	78 / 114	Würzburg	96 / 141

Debit entry authorization to secure reservation order:

I herewith authorize the Heidelberg Convention and Visitors Bureau to debit my credit card:

Master/EuroCard VISA AMEX Diners

Card# _____

valid until _____, name of cardholder _____

according to the above order with the respective amount in DM.

Changes and Cancellations: Please note that there will be a service charge of 50 DM for all changes made to the original reservation. Cancellations up to four weeks before scheduled arrival date will be charged 50 DM. Cancellations made less than four weeks before arrival will be charged 100 DM. Hotels require a one-week notice of cancellation; if the reservation is cancelled less than one week before the scheduled arrival date, charges will be made by the hotel. Please return all documents, i.e., the hotel confirmation, the travel documents, and the statement-of-booking order, to the Convention and Visitors Bureau.

(city)

(date)

(signature)



Do you have a job opening?

Reach thousands this summer—free!

EMPLOYERS: Do you have an open position for fall 1993? Post it FREE on e-MATH, the American Mathematical Society's electronic service.

JOB SEEKERS: Check e-MATH regularly for new listings of late openings.

To broadcast late-breaking positions as widely as possible during the summer, the AMS will post all positions to be filled by fall 1993 free of charge on e-MATH. Until August, you can list your available positions quickly and reach a wide range of potential applicants. This special offer applies only to positions available for fall 1993 and does not apply to 1994–95 positions.

e-MATH is an Internet service.

To access e-MATH: *telnet* e-math.ams.org or
telnet 130.44.1.100

Login and password: e-math

Choose the option: Professional Opportunities
(follow prompts)

Choose from two employment listing options:

- free e-MATH posting only (until August); or
- e-MATH plus listings in three issues of Employment Information in the Mathematical Sciences (EIMS) for \$70

If you do not have Internet access AMS will post your position for you—call Mike Saitas at 1-800-321-4AMS (4267), ext. 4190, 401-455-4190 (worldwide). E-mail: eims-info@e-math.ams.org.

Potential applicants can monitor the latest postings by browsing positions by date posted. AMS will mail to all EIMS subscribers hardcopy printout of the latest e-MATH job listings during the summer of 1993, so your listing will reach most potential applicants, including those without Internet access.



SPRINGER FOR MATHEMATICS

* Solutions Manual Available

JIM PITMAN, Dept. of Statistics, University of California, Berkeley, CA

PROBABILITY

"Jim Pitman has written a great text: elementary, yet challenging. I wish that my first exposure to the subject had been through this text! There is a wide range of examples and exercises, some of them wonderfully thought-provoking, to develop the reader's intuition and understanding. Good students from any discipline who have the calculus background should enjoy this book."

—ALBYN JONES, REED COLLEGE

This new textbook, based on a course taught by the author at Berkeley, is ideal for an undergraduate introduction to probability with a calculus prerequisite. The text's overall style is informal, but all results are stated precisely, and most are proved. Understanding is developed through intuitive explanations and examples. Graphs, diagrams, and geometrical ideas motivate results that might otherwise look like purely formal manipulations. Each section has a large number of exercises of varying degrees of difficulty, designed to teach the student how to approach a probability problem in a new setting and relate it to the standard body of theory. Throughout the text, probabilistic reasoning is developed as a powerful tool. The wide range of examples show how basic ideas may be applied to solve problems that would otherwise be difficult to approach by algebra or calculus. This leads to a much more lively approach than is usual in a text at this level, reflecting how a working probabilist thinks about random processes.

1993/app. 596 pp., 156 illus., 18 tabs.
Hardcover/\$49.00/ISBN 0-387-97974-3
Springer Texts in Statistics

Third Edition

S. GALLOT, Université de Savoie, **D. HULIN**, Ecole Polytechnique, Centre de Mathématiques, Unité de Recherche du CNRS, **J. LAFONTAINE**, Université des Sciences et Techniques du Languedoc, all of France

RIEMANNIAN GEOMETRY

This book, based on a graduate course on Riemannian geometry covers the topics of differential manifolds, Riemannian metrics, connections, geodesics and curvature, with an emphasis on the intrinsic features on the subject. Classical results on the relations between curvature and topology are treated in detail. The book is self-contained, assuming of the reader only a knowledge of differential calculus in Euclidean space. It contains exercises with solutions and a series of detailed examples which are picked up repeatedly to illustrate each new definition or property introduced. This text is ideal for both the graduate student and the professional mathematician.

1992/app. 284 pp., 95 illus./Softcover
\$32.00(tent.)/ISBN 0-387-56342-3
Universitext

S. LANG, Yale University, New Haven, CT

REAL AND FUNCTIONAL ANALYSIS

A text for a first-year graduate course in analysis, treated in a manner suitable for people who will be using it in further mathematical investigations. The book begins with point-set topology, moves into Banach and Hilbert spaces and then turns to the subject of integration and measure. It covers duality and representation theorems, applications such as Dirac sequences and Fourier transforms, integration and measures on locally compact spaces, the Riemann-Stieltjes integral, distributions, integration on locally compact groups and differential calculus. Functional analysis is covered and compact and Fredholm operators are discussed. Spectral theorems for Hermitian operators are included as well as an introduction to differentiable manifolds. The text includes worked examples and numerous exercises. Chapters are organized so that some may be omitted without compromising the exposition of material from others.

1993/app. 600 pp., 30 illus./Hardcover
\$49.50/ISBN 0-387-94001-4
Graduate Texts in Mathematics, Volume 142

J.-P. AUBIN, University of Paris, France

OPTIMA AND EQUILIBRIA

An Introduction to Nonlinear Analysis

J.-P. Aubin, a leading specialist in nonlinear analysis, has written a rigorous and concise, yet still elementary and self-contained textbook providing the mathematical tools needed to study optima and equilibria - as a means of solutions to problems arising in economics, management sciences, operations research, cooperative and non-cooperative games, fuzzy games, etc.

Topics covered include: the foundations of optimization theory and mathematical programming, convex and nonsmooth analysis, nonlinear analysis presented game-theoretically and in the framework of set valued analysis. Results are applied to the main classes of economic equilibria, game theory, non-cooperative (Nash) equilibria, Pareto optima, and core and fuzzy game theory. The book closes with numerous exercises and problems.

1993/app. 431 pp., 16 illus./Hardcover
\$59.00/ISBN 0-387-52121-6
Graduate Texts in Mathematics, Volume 140



D. COX, Amherst College; **J. LITTLE**, College of the Holy Cross and **D. O'SHEA**, Mount Holyoke College, all in Massachusetts

IDEALS, VARIETIES, AND ALGORITHMS

An Introduction to Algebraic Geometry and Commutative Algebra

Aimed primarily at undergraduates, the text emphasizes applications and the computational and algorithmic aspects of the subject. Less abstract than other texts, and with fewer prerequisites (a course in linear algebra and any course discussing how to do simple proofs), the text is ideal for undergraduates as well as computer scientists and mathematicians interested in the subject. The exposition assumes that students have access to a computer algebra system, such as Maple, Mathematica® or REDUCE, but assumes no prior experience with a computer.

1992/513 pp., 83 illus./Hardcover
\$39.95/ISBN 0-387-97847-X
Undergraduate Texts in Mathematics

P.J. OLVER, University of Minnesota, Minneapolis, MN

APPLICATIONS OF LIE GROUPS TO DIFFERENTIAL EQUATIONS

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