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Special

Issue

A tribute to German Mathematicians

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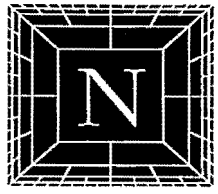

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NOTICE FOR MATHEMATICAL SOCIETIES

Please note labels are prepared during the second half of the month before the next issue. Would you please send your updated lists before this time.

Many thanks. Ms T Mäkeläinen

JEMS, the Journal of the European Mathematical Society

Editorial

Jürgen Jost

JEMS is a new mathematical research journal, founded by the EMS, aiming at the highest international scientific level, and edited by Jürgen Jost (managing editor), Luigi Ambrosio, Gérard Ben Arous, John Coates, Helmut Hofer, Alexander Merkurjev and a board of about 30 associate editors. It will be published by Springer. The first issue will appear in January 1999. The present editorial wishes to present JEMS by answering some questions about it that will naturally be posed.

Why a new mathematical journal, and why one founded by the EMS?

The EMS wants to disseminate mathematical knowledge in all countries of Europe and to support a common mathematical culture among European mathematicians. JEMS will support this enterprise as a mathematical research journal. It will cover all important areas of mathematical sciences. In this regard, it will also include ideas, results, and approaches from other fields that can stimulate mathematical research, provided of course that strict criteria of scientific quality and depth are satisfied. It aims at preserving the unity of mathematical thinking by presenting profound and important advances in both pure and applied mathematics, without recognising any preconception about a distinction or division between these two areas. We hope that JEMS will contribute to a cross-fertilisation between different mathematical fields and cultures. I believe that these aims are not completely adequately fulfilled by existing mathematical journals which rather have a tendency towards a fragmentation of mathematics into specialised subdisciplines. It is also my belief that working for these aims will support the task that the EMS has set itself.

Who will decide about papers to be published, and what will be the criteria?

While JEMS has been founded by the EMS, all scientific decisions will be taken exclusively by the editors. The journal aims at publishing substantial research articles in all active areas of mathematical sciences of the highest quality according to international standards. In cases where a profound impact for further mathematical research is expected, survey articles can also be published. Submissions of outstanding results by young European researchers are particularly encouraged. All submitted papers, however, will be evaluated by a distinguished international board of editors and associate editors on an equal and fair basis regardless of the authors' country of origin or employment.

Why do we prefer English as the language of publication?

The editors wish to create a mathematical research journal that will be accepted and recognised internationally, and not only in Europe. While there are other European languages, like French, German, or Russian, with a distinguished tradition of mathematical publishing, unfortunately many mathematicians in other areas of the world that are centres of mathematical research, like the United States or Eastern Asia, are not able to read those languages. Even in Europe, it seems that while almost every mathematician is able to read a mathematical article in English, knowledge of other languages is not similarly widespread. We realise that preferring English as the language of publication does not agree with the cultural policy of the European Union and that of certain European countries, and that this may offend the national pride of some individuals, but we believe that our aim of realising as wide a distribution as possible of articles published in JEMS is of higher importance.

What about the subscription prices? Can mathematicians from all European countries afford JEMS?

It would be incompatible with the aims of the EMS to support a journal that would be prohibitively expensive for many European countries. It is rather expected that affordable prices should lead to high subscription numbers. Thus, the subscription price will be lower than for comparable other research journals. In addition, there will be:

1) Special institutional subscription rates for Central and Eastern European libraries that will be substantially lower than the standard institutional subscription rates for several years, in order to account for the economic difficulties that those countries are presently facing during their period of economic transition.
2) Personal subscription rates for individual EMS members that are only a fraction of the institutional subscription rates, in order to encourage private subscription by EMS members.
3) Special personal subscription rates for individual EMS members from Central and Eastern Europe, initially set at 50% of the ordinary personal subscription rate.

We hope that this pricing scheme will also encourage individual mathematicians earning western salaries to donate gift subscriptions to mathematical departments, libraries, and individuals in Eastern and Central Europe.
An electronic version of JEMS will become available free of charge on the EMIS server three years after the printed version.
In any case, we hope to achieve a wide distribution of JEMS in Europe and in the world.

How long does one have to wait for having a paper published in JEMS?

The editors will make every effort to reach a rapid decision about submitted papers. The journal aims at publishing papers within six months after acceptance and receipt of the author's final version.

An Interview with Professor Friedrich Hirzebruch, Max-Planck-Institut für Mathematik, Bonn.

by Bodil Branner, Department of Mathematics, Technical University of Denmark.

BB: *Professor Hirzebruch, you were the first president of the European Mathematical Society. What do you consider to be the main goals of EMS?*

FH: When Sir Michael Atiyah started the European Council of Mathematics in 1978 the most important goal was to establish co-operation between East and West and with this in mind to form an organisation which had not only societies as members, perhaps several of one country, but also individual members, in order to give it a more flexible and less political structure than the International Mathematical Union (IMU). When I became president in 1990 the iron curtain had fallen, symbolically by the fall of the wall in Berlin, so the separation between East and West became an economic one. People in the East are now allowed to travel, but they do not have the money to do so. For example, it is difficult for them to attend the ICM in Berlin. The EMS has tried to help and should continue to give support. Although EMS does not have many financial resources itself, it can give moral support and back up applications to the European Union and the European Science Foundation (ESF), for instance. The EMS can encourage exchange programmes and stipends, to for example Russian mathematicians, so they can better survive in their home institutions.

Another important role of the EMS is to make modern communication means available to the mathematical community. With the new age of electronic communication, electronic journals and the need for large databases it is important to have an established and independent organization as EMS to be responsible. The EMS has already done a lot through EMIS and is also playing an important role in reshaping the database Zentralblatt MATH.

The negotiations with Springer-Verlag about JEMS, the new Journal of the European Mathematical Society, started under my presidency. The journal, which will be both on paper and in electronic form, is now about to come out with Jürgen Jost from the Max Planck Institute in Leipzig as its chief editor.

A third important task of EMS is to make mathematics better known and understood by the general public. Very few people are aware of the important role mathematics plays in everyday life. This we must emphasise together with the increasing need for highly educated mathematicians in society.

Every national mathematical society should of course also be aware of this role. Many attempts have already been made in this direction. For example in Germany, recently two books were published. One, *"Verständliche Forschung: Moderne Mathematik"*, is for the educated public and edited by Gerd Faltings. It consists of a collection of papers which have previously been printed in *"Spektrum der Wissenschaft"* (the German version of Scientific American).

Another one, *"Überblicke Mathematik"*, consists of survey papers for a broader audience. This is a volume in a series which is published every year by Vieweg. Let me mention also the beautiful book *"The Parsimonious Universe: Shape and Form in the Natural World"* by Stefan Hildebrandt (Bonn) and Anthony Tromba (UC Santa Cruz), published by Springer-Verlag, 1996.

The Round Tables at the European Congresses of Mathematics and the Diderot Mathematical Fora are other initiatives by the EMS in the same direction.

BB: *I would like to hear your comments on the changes in the mathematical community in the former East Germany that happened after the unification.*

FH: While the situation is now rather stable, I would not say that there was a fortunate solution for everyone. Some are jobless, but as a whole I think universities came out quite well in mathematics. The new states (*"Länder"*) entered the Federal Republic, therefore federal laws became the laws to be reinforced, and the university system had to be adapted to the one in West Germany. It was certainly not easy; for instance, most positions were previously permanent in the East, including assistant positions, and that had to be changed.

In most universities committees were formed, at the top level and for the various fields. Usually half of their members were from the East, half from the West. The committees had to prepare the transition to the new system.

This was done differently in different places. For example in the Humbolt University in Berlin everybody was fired, they were actually still being paid, but all positions had to be renewed, so people had to compete with others for the position they occupied before. This looks so very hard and strange, but in reality most senior people could retain their professorships.

The federal government introduced *"Wissenschaftler-Integrations-Programm"*. Scientists who were unable to get a position at the university or their research institute were paid five years to do research and to give them time to find a position elsewhere. In addition to this, the Max Planck Society reacted especially fast to the unification. They set up 28 working groups in different fields. These were financed for five years and attached to a university with the hope that the groups could be integrated and financed by the university when the five year period was over. The groups had excellent working conditions. They often came out of institutes of the Academy of Sciences of the DDR. There were two working groups in mathematics, one attached to the Humbolt University (*"Algebraische Geometrie und Zahlentheorie"*) and the other to Potsdam University (*"Partielle Differentialgleichungen und komplexe Analysis"*). The groups were well funded.

The two groups had money for post- and pre-doctorial stipends and for visitors. Also office space, computer and library facilities were excellent. The integration into the universities was successful to a great extent. The two mathematical groups came from the *"Karl-Weierstraß-Institut"* of the Academy where some 160 mathematicians held permanent positions. All institutes of the Academy were closed. Most institutes were then founded again, very few as a Max Planck Institute or a Fraunhofer Institute. Many became so-called "blue" institutes. These are individually funded by agreement between the Federal Government and the government of the state where they are located. Both governments pay half of the money. In West Germany institutes of the "blue list" are rare. But the "blue list" was used as an instrument for former Academy institutes. Also the Karl Weierstraß Institute lives again as a blue institute under the name *"Weierstraß-Institut für Angewandte Analysis und Stochastik"*. After the two Max Planck working groups left, and some people went to industry or early retirement, the institute has now around fifty positions which are mainly permanent, though this will be changed gradually. The number of permanent positions is very large in comparison with the *"Max-Planck-Institut für Mathematik"* where only three directors and three other mathematicians are on permanent Max Planck Society positions.
So many Academy institutes survived by becoming blue. The blue institutes (east and west) are loosely joined in a "blue society" which accepted the name Gottfried Wilhelm Leibniz Society. The DDR Academy itself was closed and reopened as *"Berlin-Brandenburgische Akademie der Wissenschaften"* carrying on, as the DDR Academy did, the traditions of the academy founded by Leibniz in 1700. The 300th anniversary of this academy is in preparation. Altogether sixteen new Max Planck Institutes have opened in the new states after the unification. Among them, the *"Max-Planck-Institut für Mathematik in den Naturwissenschaften"* was founded in Leipzig with Jürgen Jost (formerly Bochum University), Stefan Müller (formerly ETH Zürich), and Eberhard Zeidler (formerly Leipzig University) as directors. This is a young and very energetic team. The institute is in a beautiful building and has ideal working conditions in every respect.

BB: *You started to study mathematics at a very difficult time.*

FH: I started in Münster in December 1945 under Heinrich Behnke. He had come back to Münster in the Summer of 1945 to build up the university again. He did not take part in the war, at the end he had lived in Oberwolfach. He became the Dean of the Faculty of Philosophy and Sciences. He died in 1979. By the end of June 1998 we celebrated Behnke's 100 years birthday in Münster.
I was just 18 when I started. Many students were much older. They had spent seven years in the war. We were all happy to be able to study, and to be alive. The city had been destroyed, and very little of the university had remained. So in the beginning we only had lectures one day every third week. In between we had lots of homework. We had to share one of the very few usable lecture halls with other fields. We soon became about 300 students in mathematics. There was no library and no books, only notes. I had however a few books from my father, who was a teacher in mathematics and the head of a secondary school. The situation improved rather fast, already in the second semester another building had been repaired and there were lectures every second week. From the third semester we moved to temporary buildings and were able to have a full programme and to live in an active mathematical atmosphere. Until then I had lived at home, in Hamm about thirty kilometres away, and commuted by train; it often took hours to travel this rather short distance. But from then on I had a room in Münster.
I learned a lot about complex analysis from Behnke. From the Summer of 1949 I studied three semesters at the ETH in Zürich where I learned topology and many other things from Heinz Hopf and Beno Eckmann and wrote my dissertation under Hopf on singularity theory in two complex dimensions. I received my Ph.D. degree from Münster University under Behnke in the summer of 1950. In 1954/55 I obtained my Habilitation in Münster with my book *"Neue topologische Methoden in algebraischen Geometrie"*. The results were achieved during the two year visit I paid in 1952 1954 to the Institute for Advanced Study in Princeton. There I was together with Borel, Kodaira, and Spencer. Using Thom's cobordism theory I was able to complete my proof of the Riemann-Roch theorem in December 1953. For the academic year 1955/56 I came back to Princeton as an assistant professor at the university. I had thought I would stay longer. But I returned to Germany in June 1956 to accept a chair at Bonn University which had been offered to me already in 1955 before I left to Princeton.

BB: *Immediately after you came back from the US you started the famous workshops called "Arbeitstagung".*

FH: Yes, I wanted to develop international contacts. The first Arbeitstagung was in 1957. Present were Atiyah, Grauert, Grothendieck, Kuiper, and Tits. They were together with me the founding members. Over the years the meetings grew to a size of about 200 participants. My idea was to have such a meeting each year. Often people start to prepare a meeting two years in advance, with correspondence about speakers and topics. I wanted to minimize the work, but more important to have the latest information. So out of laziness and search for efficiency grew a structure where very few lectures were decided ahead of time, and most were decided during open programme discussions. As a result many achievements were first reported during some Arbeitstagung. Very often Michael Atiyah was the first speaker.
We usually did not have proceedings, but at the 25th meeting in 1984 we had one, published as Springer Lecture Notes in Mathematics Vol. 1111, and for that special event half of the talks were decided ahead of time. Besides being proceedings of that meeting it also surveys the previous ones.
In 1991, at the 30th meeting, I announced that this was the last Arbeitstagung that I would arrange. After that it was decided that there would be meetings every odd numbered year. There have already been three meetings in this new series.

BB: *You kept your professorship at Bonn University while you were director of the "Max-Planck-Institut für Mathematik" in Bonn. This seems to me to be a very personal choice.*

FH: If I had insisted, the Max Planck Society would certainly have agreed to pay me full time as director. But I like teaching very much, in particular I like to follow students from the start, so a number of times I taught a consecutive sequence of courses from the beginning and all the way leading to specialised courses. When I became the director of the Max Planck Institute in 1982 it was agreed with the university that I would keep my teaching duties, but be given some privileges. I had less administrative duties inside the university, only when it was really needed I had to participate in special sessions, for instance hiring committees for professorships. I also had more sabbaticals than other people. This was mainly done with the purpose that I could concentrate on my work as director of the MPI and not go away as other people would usually do during their sabbaticals. This was a good solution, but I must say that I had to give up the idea of running seminars.
I retired from my professorship at the university in February 1993 and as director of the Max Planck Institute in October 1995.

BB: *Has the way in which the MPI in Bonn is organized changed over the years?*

FH: No, we have tried not to enlarge the number of visitors. It has a good size, people still know each other. Sometimes we have special activities, but this is not regular. We have kept a very flexible structure. Individual mathematicians can apply at any time. But if a mathematician will be the only one working in an area then we will advise him or her to go somewhere else. People here should talk together and work together.
We shall soon move to a larger building. A report about this plan is contained in a recent issue of the Notices of the American Mathematical Society.

BB: *As in the Scandinavian countries, there are very few female mathematicians in Germany, at least in the former West Germany. Do you foresee any changes in this situation?*

FH: There are very few women who continue after the Diplom Exam to get their Ph.D. degree and Habilitation. At Bonn University only two or three women have finished a Habilitation in mathematics. But there are female applicants to most positions at universities. There are certain rules, that vary in the different states, which imply that if a woman applies she should get a chance to present herself. But still often she ends up as number three on the list of candidates and not number one. So she finally does not get the position. I don't want to say that there is discrimination, I hope not. The competition is very hard. But I do not see any real changes in the situation coming up.
At the Max Planck Institute we have always had a fair number of female visitors, reflecting the international level. In July this year I organise a special programme at the MPI on the Topology of Algebraic Varieties together with Mina Teicher from Israel.

BB: *You have close relations to Israel.*

FH: My first visit to Israel was in 1981 as a Sackler lecturer at Tel Aviv University. But since I received the Wolf Prize in 1988 I have returned almost every year.
The Minerva Stiftung is a daughter of the Max Planck Society. It is funded by the Federal Government for the scientific co-operation with Israel. There exist 42 Minerva Centers in Israel at universities, the Weizmann Institute and other research institutions. Minerva supports the host institution with a capital endowment (in many cases 2 Million DM) to be invested. The interest is matched by the host institution and both add up to the annual budget of the centre.
Three centres are devoted to mathematics (the Edmund Landau Center for Mathematical Analysis at the Hebrew University established 1987, the Emmy Noether Mathematics Center in Algebra, Geometry, Function Theory and Summability at Bar Ilan University established 1991, and the Herman Minkowski Center for Geometry at Tel Aviv University established 1995). The centres have visitor programmes, post doc positions for Israelis and Germans and organize meetings and summer schools. Each centre has an advisory board consisting of three or four Israelis and the same number of Germans, always with a German in the chair. I was the chairman of the board of the Edmund Landau Center and am the chairman of the board of the Emmy Noether Center.

BB: *You have been the president of the "Deutsche Mathematiker-Vereinigung" twice, and both times happened to be very special.*

FH: I was elected as president of the DMV in 1961 at the last joint meeting in Halle in the DDR. Shortly before that meeting the wall in Berlin was erected and suddenly it was not possible for all members of the presidium to meet in the same place. East Germans had to stay in East Germany (including East Berlin). West Germans could travel to East Berlin and East Germany, with some trouble to obtain visas, but West Berliners could not. There was no place in Germany where all types of Germans could meet together. I invited the presidium to Berlin. We met twice, in East Berlin and West Berlin. I went through the wall for the first time. A separation was unavoidable, moreover the government of the DDR and in particular the DDR Academy of Sciences, wanted an independent representation in the International Mathematical Union. In 1962 the Mathematical Society of the DDR was founded and mathematicians in the DDR were no longer allowed (by their government) to be members of the DMV. You can read about this development in the new book *"Mathematics without Borders: A History of the International Mathematical Union"* by Olli Lehto, secretary of the IMU 1983–1990. It was published by Springer-Verlag, 1998.
The second time I was president was in 1990, the year when the DMV celebrated its 100th anniversary. I had been asked some couple of years before and had agreed. I was told there would not be much to do, but suddenly I found myself very busy with problems concerning how to unify the two mathematical societies. The Mathematical

Society of the DDR had, contrary to the DMV in the West, many secondary school teachers as members and it was debated if they could all become members of the new reunified society (if they wanted). At the end it was agreed that all members of the DDR society could become members of the new society which, in fact, legally was the old DMV. The DMV did not make any political investigations. In case of suspected co-operation with the Stasi such checks had to be done at the working place of that person.
The new DMV immediately started to prepare the invitation to host the International Congress of Mathematicians in Berlin in the year 1998.
I received the last medal of merit of the Mathematical Society of the DDR.

BB: *You are the honorary president of the International Congress of Mathematicians in Berlin.*

FH: I am the honorary president of the organising committee of the ICM. I did not do much work. But I managed to obtain a special postage stamp for the congress with a mathematical motive. There have been special stamps in connection with five of the earlier congresses, namely 1966 in Moscow, 1978 in Helsinki, 1982 in Warsaw (although the congress was postponed to 1983), 1990 in Kyoto, and 1994 in Zürich. I submitted a lot of material which was distributed to several artists. From the proposals, drafted by the artists an independent non-mathematical committee selected a motive showing an almost square subdivided into different squares. Behind this the artist has chosen to show the beginning of the decimal extension of π, repeatedly arranged in arcs, so that it reminds us of a full auditorium. The special stamp will be presented at the opening of the ICM by the state secretary of the federal ministry of finance.

BB: *Thank you very much.*

The Mathematisches Forschungsinstitut Oberwolfach

Matthias KRECK
Director

The Mathematisches Forschungsinstitut Oberwolfach was founded in 1944 by Wilhelm Süss. According to Süss' wife, who wrote a little booklet on the history of the institute, the intentions of her husband were to give mathematicians the chance to do research instead of participating in the war. Another reason which was given is to create an institute which after the war might serve as a European centre similar to the Princeton Institute for Advanced Study.

It is very likely that the official reasons of the Nazi government were different. Only very recently, documents from the Nazi era concerning the history of the institute as well as more generally of the DMV (Deutsche Mathematiker Vereinigung) and Wilhelm Süss, who not only was president of the DMV until 1945 but also Rector of Freiburg University, were made accessible to historians. I hope that we will know more about this period in the near future.

After the war, the institute survived with a very small programme under difficult conditions. Süss remained director of the institute and managed to keep it alive. After the war, the institute played a particular role in establishing contacts between mathematicians from abroad and Germany. As far as I know, German scientists were for many years excluded from international contacts as a reaction to the first World War. Although Germany acted much worse during the Nazi time than during the first World War, contacts began almost immediately after the war.

In July 1945, the French military government sent an officer to requisition the building of the institute, a little castle, or better a hunting lodge called Lorenzenhof, for his troops. By chance the British mathematician John Todd was present at the institute on behalf of the British military government. He convinced the French officer to change the plans, and the institute survived.

Very prominent French mathematicians including Henri Cartan and Charles Ehresmann, as well as Heinz Hopf from Switzerland, took part in colloquia at the institute in the early years after the war. This gave young German scientists the chance to meet leading colleagues from abroad and was a great help in rebuilding mathematics in Germany. I think that it was particularly difficult for those mathematicians, who were forced by the Nazi regime to leave Germany, to return to the country which had been their homeland. I was very touched when I read that Hermann Weyl said during a stay in Oberwolfach that for the first time after the war he felt completely happy among German mathematicians.

Besides the main task of the institute, which is to

provide excellent conditions for mathematical research, I personally think that Oberwolfach with its dark beginning has an obligation to serve as a place where mathematicians from all over the world and with very different cultural backgrounds can meet and cooperate, adding in this way a little bit to peace in the world.

During the fifties, there were long periods with no special activities at the institute. In 1958, Süss died and his successors, Hellmuth Kneser, Theodor Schneider, and in particular Martin Barner created, with the help of the Volkswagen Foundation, the modern Oberwolfach Institute which we all know. The guest house was completed in 1967, the Lorenzenhof was replaced in 1974 by the modern library building. Scientifically, the old idea of bringing the best mathematicians together remained unchanged, but as a consequence of the increasing specialization of mathematics, the character and, in particular, the number of the meetings changed.

Nowadays, there are conferences in Oberwolfach all the year around except at Christmas time. The number of participants in a meeting is between 40 and 50 people. The international character is demonstrated by the distribution of the participants: about 30% are Germans, another 30% come from the rest of Europe, 22% from the US, and the rest from other countries. The programme covers all areas of mathematics, and interdisciplinary activities with physicists, engineers, biologists, and medical statisticians play a big role. The programme is annually decided by the Scientific Board, which consists of 20 leading European mathematicians.

To give an impression of the topics represented in Oberwolfach here is the programme for the last four months:

14.06–20.06.98	*Algebraic Geometry*
21.06–27.06.98	*Geometric Analysis and Singular Spaces*
28.06–04.07.98	*Quantum and Classical Integrable Systems*
05.07–11.07.98	*Calculus of Variations*
12.07–18.07.98	*Arithmetic of Fields*
19.07–25.07.98	*Verallgemeinerte Kac-Moody-Algebren*
26.07–01.08.98	*Spectral Theory and Stochastic Analysis*
02.08–08.08.98	*Mathematical Methods in Tomography*
09.08–15.08.98	*Nichtkommutative Geometrie*
16.08–22.08.98	*Nonlinear and Stochastic Systems*
23.08–29.08.98	*Mechanics of Materials*
30.08–05.09.98	*Komplexe Analysis*
06.09–12.09.98	*Topologie*
13.09–19.09.98	*Homotopietheorie*
20.09–26.09.98	*Inverse Wave Scattering Problems and Applications*
27.09–03.10.98	*Geometrie*
04.10–10.10.98	*The Nilpotence Theorem in Stable Homotopy Theory* (Arbeitsgemeinschaft mit aktuellem Thema)
11.10–17.10.98	DMV-Seminar: *Nonsmooth Optimization: Algorithms and Applications*
11.10–17.10.98	DMV-Seminar: *Arithmetic Fundamental Groups*

The institute is very proud of its excellent infrastructure, in particular of the library, which is one of the best worldwide. We subscribe to more than 400 journals and have an outstanding collection of monographs. In the last few years, the computer equipment has been very much improved.

The aim of the institute is to provide excellent conditions for mathematical research. Interaction between mathematicians plays an increasing role in the development of mathematical research. Numerous important research projects originated from discussions between participants of the meetings. Since 1995 we have a new programme *"Research in Pairs"* (RiP). Two—or in exceptional cases up to four—mathematicians can carry out a joint research project at the institute. The minimal duration is two weeks, the maximum is three months. In the three and a half years of its existence, numerous interesting results emerged from this programme. I would like to encourage anybody who has an interesting research project which he wants to carry out with a partner from another place, to apply for this programme. Applications can be sent in any time, and the reviewing process is very quick and efficient.

Oberwolfach is one of the best research centres worldwide. Unfortunately, as almost everywhere, financial problems have increased in the last years. If we hadn't obtained support from two foundations: Volkswagen-Stiftung und Mollgaard-Stiftung, we would have been forced to make drastic reductions of the scientific programmes or of the infrastructure. Also, the Forderverein *(Friends of Oberwolfach)* helped a lot in the last years. This association has about 600 members. I hope that this number will still increase. Recently, within this association a new foundation was created. We hope that in this way we will be able to collect considerable funds. Of course, it's unrealistic to finance the whole institute by this money, but it can be used to solve unexpected financial problems, which might occur, particularly in connection with the buildings. The buildings are owned by the association which runs the institute *(Gesellschaft für Mathematische Forschung)*. There are good chances to get money from the foundations mentioned above and the Forderverein until the end of 1999. The year 2000 will be very critical. The officials of the institute will have to convince the State that it is in its own interest to guarantee sufficient support for this outstanding institute.

Deutsche Mathematiker-Vereinigung (DMV)

Checked and Revised by Ina Kersten, Vice-president of the DMV

Introduction

The Deutsche Mathematiker-Vereinigung (DMV) is the German National Mathematical Society. Its goal is to promote mathematics and its applications, by furthering mathematical research and scholarship and the use of mathematics, fostering the awareness and appreciation of mathematics by the public, and representing issues of mathematics wherever science and education are concerned.

The DMV was founded in Bremen in 1890. The first president was Georg Cantor. Among his successors were Felix Klein, David Hilbert, Hermann Weyl, Heinrich Behnke, and many other eminent mathematicians. The current President, since 1998, is Karl-Heinz Hoffmann.

Today, more than 3000 DMV members represent the German active mathematical community in universities, high schools, and industry. Besides protecting the scientific interests of its members, the DMV influences political decisions regarding research and education. For this purpose, the DMV takes positions on areas of great social importance, such as the teaching of mathematics. The DMV initiates and coordinates various projects—aiming, for example, to enhance collaboration between universities and industries, or to develop information and communication.

The DMV represents Germany in international mathematical organisations, such as the European Mathematical Society and the International Mathematical Union. Reciprocity agreements ensure links between the DMV and mathematical associations from many countries, as well as with other German scientific societies.

Publications

Since the year of its foundation, the DMV publishes the *Jahresbericht*, a yearly report with four issues containing surveys (e.g., invited lectures of the *Jahrestagung*), obituaries, and book reviews. This series includes Hilbert's famous *Zahlbericht*. Volume 100 will appear in 1998, including a report of Marcel Berger on the development of Riemannian geometry in the last half century. The current editor of the *Jahresbericht* is Aloys Krieg (Aachen), `krieg@rwth-aachen.de`, together with Ursula Gather (Dortmund), Ernst Heintze (Augsburg), Bernhard Kawohl (Köln), Herbert Lange (Erlangen), and Hans Triebel (Jena).

The DMV also publishes a quarterly informative circular for its members, called *Mitteilungen der DMV*. The editors are

Günter M. Ziegler (TU Berlin)
`ziegler@math.tu-berlin.de`,
Martin Aigner (FU Berlin)
`aigner@math.fu-berlin.de`,
Gerd Fischer (Düsseldorf)
`gerdfischer@cs.uni-duesseldorf.de`.

Since 1996, the DMV publishes the journal *Documenta Mathematica*, which is both a printed journal and an electronic journal. The managing editors are

Alfred K. Louis (Saarbrücken)
`louis@num.uni-sb.de`,
Ulf Rehmann (Bielefeld)
`rehmann@mathematik.uni-bielefeld.de`,
Peter Schneider (Münster)
`pschnei@math.uni-muenster.de`.

The Proceedings of the International Congress of Mathematicians (ICM 1998) will appear as a special volume of *Documenta Mathematica*; so, for the first time, the ICM Proceedings appear as a hard cover book as well as electronically, at

`http://www.mathematik.uni-bielefeld.de/documenta/`

The DMV publishes a yearly book about mathematical institutes in Germany (formerly *Oberwolfach-Verzeichnis*), which can be obtained from the Office of the Society. In addition, the DMV collaborates in the publication of the journals *Mathematische Semesterberichte*, through Hans-Joachim Vollrath (Würzburg), and *Surveys for Mathematics in Industry*, through Georg Bock (Heidelberg). The following series are published under the auspices of the DMV: *Dokumente zur Geschichte der Mathematik*, edited by Winfried Scharlau (Münster), and *DMV Seminare*, edited by Willi Jäger (Heidelberg).

Conferences

Every year, the *Jahrestagung* brings together the members of the Society in a meeting reflecting the progress of mathematics in a broad spectrum of survey lectures. A variety of subsections treat special fields and, in particular, offer young mathematicians a forum for communicating their results. In fact, a Conference for Students in Mathematics (*Studentenkonferenz Mathematik*) is held in the framework of every *Jahrestagung*. Participants to student conferences can submit their degree theses; a jury selects several of these to oral exposure during the conference and awards prizes. Although there is no conference in 1998 (due to the ICM), there is a Junior Mathematical Congress in Potsdam as an ICM satellite.

The next two *Jahrestagungen* will take place in Mainz, from 5th to 11th September 1999, and in Dresden, from 18th to 23rd September 2000.

Besides the *Jahrestagung*, various other meetings are organised by the DMV, some jointly with other national societies, some by special interest groups.

Special Interest Groups

Several activity groups of members (*Fachgruppen*) with common interests in special fields or aspects of mathematics have evolved under the auspices of the DMV. They work to improve the exchange of information

relevant to their needs, e.g., by the installation of electronic networks, or by the organisation of conferences and meetings. Presently there are the following groups:

- Computer Algebra
- Discrete Mathematics
- Geometry
- History of Mathematics
- Information and Communication
- Mathematical Education
- Mathematical Logic
- Mathematics in Industry and Economics
- Numerical Software
- Optimisation
- Scientific Computing
- Stochastics

The representatives of these Special Interest Groups meet together once a year, on the occasion of the *Jahrestagung*. The 1998 meeting will take place on the 25th of August in Berlin.

Seminars

The Oberwolfach Mathematical Research Institute organises, jointly with the DMV, seminars addressed to young portgraduate mathematicians. These seminars are intended to provide students with a knowledge of different subjects and help them find a direction for their research. The number of participants is usually restricted to 25. The programme for 1998 is the following:

- Mathematical Economics and Finance (May 31–June 6)
- New Geometric Methods in Representation Theory (May 31–June 6)
- Nonsmooth Optimisation: Algorithms and Applications (October 11–17)
- Arithmetic Fundamental Groups (October 11–17)
- Topological Problems of Wave Propagation Theory (November 22–28)
- Mirror Symmetry (November 22–28).

The Georg Cantor Medal

Since 1990, the DMV has awarded a Medal every second year, in memory of Georg Cantor (1845–1918), who was the first president of the Society. The winner of the Medal is selected by the *Präsidium* of the DMV, on the grounds of the excellence of his/her mathematical achievements, from amongst researchers linked to German-speaking countries. Every member of the DMV can submit names of candidates for Medal awards. The former Medal winners were Karl Stein (1990), Jürgen Moser (1992), Eberhard Heinz (1994), and Jacques Tits (1996).

Committee

The Committee (*Präsidium*) of the DMV consists of the Board (*Vorstand*), the editor of the *Jahresbericht*, and seven additional members. The current list of members is the following:

President:
Karl-Heinz Hoffmann (TU München)
hoffmann@appl-math.tu-muenchen.de

Vice-president:
Ina Kersten (Bielefeld)
kersten@mathematik.uni-bielefeld.de

Treasurer:
Jochen Brüning (HU Berlin)
bruening@mathematik.hu-berlin.de

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Jürgen Lehn (Darmstadt) and Ulrich Mertins (Clausthal) are Auditors.

Office

The Office of the DMV is located in the Weierstraß Institute in Berlin, with the following address:

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e-mail: dmv@wias-berlin.de

Manager: Frau A. Bertholdt

Web site

Additional information about the DMV can be found in the web site

http://www.mathematik.uni-bielefeld.de/DMV/

This web site was created and managed until April 1998 by Dirk Ferus (TU Berlin). It is maintained under the direction of Ina Kersten, Vice-president of the Society.

The Database Zentralblatt-MATH

Mathematicians have always been relying on information that can be found in already published articles, either to locate a precise result, or to get inspired by a proof, or to be better informed about the accomplishments of one of their colleagues. To access this information, they use *bibliographical databases*. For a while three databases were available for that purpose: the *Referentnyi Journal* (RJ), the *Mathematical Reviews* (MR) and the *Zentralblatt für Mathematik und ihre Grenzgebiete* (ZM). Because of the economical difficulties to which Russia is presently exposed, RJ recently merged with ZM.

History

The *Zentralblatt für Mathematik* was founded in 1931 by Otto Neugebauer, then professor at Göttingen University, but he was soon forced to leave Germany because of the installation of the Nazi regime. In 1933 he continued to work for the journal from Copenhagen. He could not go on with this job because this was not tolerated any longer by the new power in Berlin. He emigrated to the US where, in 1940, he founded ... the Mathematical Reviews.

It is only in 1948 that K.L. Schmidt managed to get ZM back on its feet. It was then jointly produced by the Deutsche Akademie der Wissenschaften and Springer-Verlag. Politics interfered again in 1961 when, at the time of the erection of the Berlin wall the Akademie was forced to split into a western and an eastern part. On the FRG side, the Heidelberger Akademie took over the responsability of ZB, and has retained it until now.

The coming into play in 1977 of the FachInformationZentrum, an agency of the Federal Government located in Karlsruhe, led the GDR government to stop the involvement of the eastern component of the Akademie. From then on, the database had a computer base.

In November 1997 the three partners, who have been jointly carrying out the responsibility of producing ZB for 20 years, agreed to share its copyright with the European Mathematical Society in an effort to transform it into a truly European venture. The formal signing took place in Heidelberg in May 1998.

Who contributes to it?

The central office of ZM is in Berlin under the direction of Bernd Wegner, professor at the Technische Universität Berlin. Besides its permanent staff, it relies on its more than 5000 reviewers worldwide to produce annually more than 60,000 citations per year.

From 1931 to present, more than 1.5 million citations are stored in the database. For the moment only citations that have been produced after 1977 are fully available electronically.

Products

Presently, the database ZM, whose official name is since last May *Zentralblatt-MATH*, is available *free of charge* on the EMS server EMIS, if you are content with only three items of information for any query.

If you want full service, you need to subscribe to ZM. It can be delivered to you in three different formats:

- the traditional *paper version* growing at a pace of approximately 1 metre a year; it is distributed by Springer-Verlag in its yellow clothing that will be soon modernised;
- the *on-line service*, that used to be called MATH, and which is now available on the main site in Berlin (e.g. through the EMS server EMIS), but also on two mirrors: one in Strasburg that was inaugurated last March in presence of some European deputies; one in New York;
- finally, the newest form is the CD-rom that exists in various standards to accommodate operating systems from DOS to all versions of Unix; it can be used either on a single machine or in a local network, freeing the users from the uncertainties of the Web.

The format under which you access the database electronically, which is now remarkably user-friendly, and the retrieval software have been designed by MathDocCell, a service unit set up in Grenoble by the CNRS and the University Joseph Fourier, under the leadership of Pierre Bérard and Laurent Guillopé. This new partnership is hoped to be the first of a long series of national contributors to the running of the database. They can help improving its team of reviewers, accessing national literature and getting comments from users more quickly.

New projects

One of the main concerns of the EMS in joining ZB is to make sure that the feedback from mathematicians is properly used to improve the database. For that purpose an *Innovations Committee* has been set up under the chairmanship of *John Coates*, and with the participation of *Alberto Ibort, Michael Kaplan, Jerry L. Kazdan, François Loeser, Alberto Marini,* and *Peter Michor*.

As gateway to ZB, the EMIS server will soon offer a new service free of charge, namely the *Current Awareness Programme*. Tables of contents, and hopefully front pages of articles of numerous journals, will be offered for a 6 month-period after their first appearance. Later, the data collected this way will be integrated into the database ZB.

Jahrbuch der Fortschritte der Mathematik was the first reliable and comprehensive archive of mathematical publications, and the forerunner of modern databases. It was published one volume per year from 1868 until 1942, and each volume attempted to review all mathematical research publications appearing in the given year. Altogether, about 200,000 items are covered in the Jahrbuch. The editing was carried out by the Prussian Academy of Sciences, with the help of an international board of reviewers, and it was published by Walter de Gruyter Verlag. A German programme aims to make these data available electronically. This is led by *Keith Dennis* from Cornell University and by *Bernd Wegner*. In a second stage, comments made by historians on the

papers presented in the Jahrbuch will be added, together with links to appropriate references.

The EMS has already worked hard at having ZB recognised as a *European Large Infrastructure*. This will enable it to apply to an EU programme, which will help to improve ZB. Typical improvements are incorporating into the database all reviews from 1931 to 1977, and also creating an index of authors to overcome the various disguises in which a given name may appear in different journals. We should know for sure in 1999 whether our efforts have been successful.

Who should you contact?

The database is already known to almost all of you. Many use it either on a regular basis or occasionally. ZB is accessed more than 100,000 times monthly, and it has 555 primary and secondary subscribers.

We hope that the new environment that it offers, and the possibility that is given to you to interact with it, and hopefully make it better suit your needs, will convince you to have your institution subscribe to ZB, if it does not do it yet.

Please feel free to contact directly the editors:

- in Berlin *Olaf Ninnemann* (olaf@zblmath.fiz-karlsruhe.de)
- or in Grenoble (accueil@mathdoc.ujf-grenoble.fr),
- or else members of the Innovations Committee.

You can also ask to have access to ZB for a trial period. You will soon be convinced that you cannot do without it!

New release of MPRESS—The Mathematics PREprint Server System

URL http://www.mathematik.uni-osnabrueck.de/MPRESS/

MPRESS is a world-wide initiative to organise mathematical preprint servers in a distributed way. MPRESS will improve access to the full texts of preprints in mathematics and will provide comprehensive and easily searchable information on the preprints available.

The initiative has been started under the auspices of the European Mathematical Society (EMS) by alerting its member societies to progress the project in their region and it has been well accepted by non-European mathematicians who have already joined the system as partners. MPRESS is open to any institution which agrees to make its preprints freely available to the public and to comply with the modest standardisation required by MPRESS.

MPRESS has already been offered for some time within the Math-Net-project. This period has been used to improve the service and to include new partners. What we call the 'new release' of MPRESS consists of

- an extended number of participating distributed preprint servers;
- an effective 'harvesting' component for the information on preprints;
- additional sites for the electronic submission of preprints of individuals who are not associated with a local preprint server.

Preprints in Mathematics

Preprints are of increasing importance for timely information on research achievements in the mathematical community. The electronic medium makes it easy and cheap to produce and to provide preprints through electronic channels. A lot of mathematical departments and institutes have built their own preprint archives during the last years. This has been done in a non-coordinated fashion that results in limited user-friendliness. The user has to spent a lot of time for searching and retrieving relevant preprints on the distributed servers. Furthermore, comprehensive information is missing on what is available. However, different strategies are possible to overcome these problems.

Central model:
All preprints will be collected at one site and offered in a prescribed uniform way.

Decentralised model:
The full texts of the preprints are collected at distributed servers. This model

- requires a modest standardisation of the description and the management of preprints at the distributed sites

- must provide global information of the distributed preprints
- will help all sites to install their offerings in a uniform way.

A central model for MPRESS is rejected because it needs a lot of financial support and hence it will have political implications for the accessibility of preprints in the near future. Having distribution dominated by one big provider would very soon differentiate between privileged and unprivileged authors of preprints with reduced visibility of the achievements of the latter class.

MPRESS wants to rely on the economic background and the scientific responsibility available at the respective sites where the preprints are produced and to keep equal chances for all researchers as much as possible.

To install a global information system on preprints available through MPRESS a homogeneous description is necessary. MPRESS will use the international accepted Dublin Core Metadata Standard for this.

The most important metadata are

- author(s) of the preprint,
- title,
- institution,
- Mathematical Subject Classification (MSC 91),
- keywords,
- abstract of the preprint,
- document identifier.

Further attributes (such as preprints published within a series of an institution) are possible.

Each institution participating in MPRESS should offer its preprints including the defined metadata above. The preparation of the metadata should be done by the authors. Simple tools are already provided to produce these metadata. See for example the tool MMM at the URL

`http://www.mathematik.uni-osnabrueck.de/projects/META/MetaMake2.2.html`

These tools are freely available on the Internet for downloading.

Within the Internet community efficient tools (a.e. Harvest) have been developed for automatically collecting distributed information. Using these tools MPRESS will gather the metadata from the local preprint archives at special participating institutions that are responsible for the collection in a certain region. The institutions act as volunteers and contribute their collections to a worlwide index of current preprints. The access to this system will be free.

The current status

MPRESS is currently available at the URL

`http://www.mathematik.uni-osnabrueck.de/MPRESS/`

MPRESS contains more than 10000 mathematical preprints from Germany, France and Austria. The French part of the system

`http://www-mathdoc.ujf-grenoble.fr/math-prepub`

was initiated and is managed by Cellule de Coordination Documentaire Nationale pour les Mathematiques. Furthermore, MPRESS collaborates with the Topology Atlas

`http://www.math.yorku.ca/Seminars/Topology/atlas/`

where also a preprint archive is provided. Partners in Russia, the Netherlands, Italy, Finland are ready to join MPRESS.

A further component of MPRESS is a full text archive with convenient submission facilities prepared by the Konrad-Zuse-Zentrum Berlin

`http://www.math-net.de/mpress`

Further items (Metadata of print only preprints) will be delivered by the University Library of Goettingen, Germany.

The current system will be the basis for future extensions. Any comments and proposals are welcome. In particular the reader of this article should be alerted to check whether his institute already takes part in the cooperation organised through MPRESS.

Please contact me accordingly at

`wegner@math.tu-berlin.de`

Bernd Wegner

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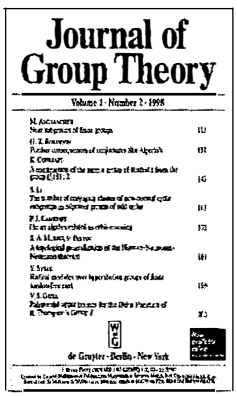

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OSU Mathematical Research Institute Publications

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INTERVIEW WITH DR. IAN FRIGAAR,
SCHLUMBERGER DOWELL

The EMS Committee on Applications of Mathematics plans to conduct a series of interviews for the EMS Newsletter, e.g. with recent mathematics graduates who now work in industry. Of course, all views expressed are strictly personal, relate to the specific situation of the person interviewed and cannot be generalised. The first (e-mail) interview was conducted by the chairman of the EMS Committee on Applications of Mathematics, Prof. Heinz W. Engl (Industrial Mathematics Institute, Johannes Kepler Universitaet Linz, Austria) with Dr. Ian Frigaard (Schlumberger Dowell, Paris):

Q: *What kind of work do you currently do in your company?*

A: The technical work involves solving practical engineering problems, usually involving continuum mechanics and, more specifically, fluid mechanics of non-Newtonian fluids. The background to this is that Schlumberger Dowell are involved in providing cementing and drilling fluid services to the oil industry.

Q: *How (much) does it relate to mathematics?*

A: The content of the work that I do is largely mathematical. However, this does not mean that I spend my time "doing mathematics"; significant proportions of my time are spent writing reports/papers, presenting and explaining my work, directing/helping others, programming, training, travelling, e-mail and bureaucratic activity. I think this is common in any large multi-national company.

Q: *Tell us about your mathematical education and prior experience before your current employment.*

A: I have a B.Sc. in Mathematics from the University of Wales, which is a general 3 year UK mathematics degree. Following this I specialised in applied mathematics with an M.Sc. in Mathematical Modelling and Numerical Analysis at the University of Oxford. Finally I studied for my D.Phil. at Oxford. Although this was within the Department of Engineering Science, it was largely industrial mathematical modelling.
My current position is my fourth job. I spent three years working at Alcan International's Banbury Research Laboratory, (UK), during and after my D.Phil. The work here coincided largely with my D.Phil. thesis work and was involved with modelling a novel Aluminium spray process. Following this I spent 2 years as an ECMI post-doctoral research fellow at the Institute for Industrial Mathematics, University of Linz, Austria. Here I did some feasibility type research for Voest Alpine Industreanlagenbau, on a Steel continuous casting process. I spent some time involved in activities with the ECMI resarch network active at the time and some time publishing work from my thesis. I also lectured in fluid mechanics at the university. I joined Schlumberger Cambridge Research after this and spent 18 months there before starting my current job. My experience there was quite varied, with much learnt about the oil industry & oilfield-type engineering, rather than undertaking any particular or significant mathematical work.

Q: *How do you view all this in view of your current work? What was especially important, what was missing and should have been emphasized more?*

A: Most of my work in the past 7–8 years has been in the area of industrial/applied mathematics. I think I was fortunate to do the M.Sc. course, which gave me enough confidence (and a toolbox of skills) to go out and tackle some real problems. After this, every experience has helped to build my problem solving abilities. I've changed industry 2–3 times now and each time I find the learning curve of "what the problems are" is easier to climb. Two important things from my perspective are:

(i) in an applied mathematician's education "modelling" and "problem-solving" are essential, but if they want to work in industry the first thing to recognise is that the "problem" is not a mathematical one (at least at first). This is hard to put into a conventional maths education and should not be at the expense of learning mathematics.
(ii) once working in industry as a mathematician, the opportunities to stay in touch and work with academic mathematicians become very important intellectually.

Q: *How much of your work needs numerics?*

A: Nearly all, but the numerical mathematics is rarely used/useful where I don't already understand the problem/solution at least partly through analysis or intuition.

Q: *What skills in addition to mathematical ones do you need most?*

A: Diplomacy, communication and presentation skills. The ability to see through business bullshit.

Dr. Frigaard also expressed his view that in his experience, companies rarely hire mathematicians as such, but they are looking for people with expertise in a specific problem area, so that mathematicians have usually to compete with engineers. This series of interviews with Applied Mathematicians will be continued in the next issues.

European Women in Mathematics: Current Activities

EWM is an affiliation of women bound by a common interest in the position of women in mathematics. Our purposes are:

- To encourage women to take up and continue their studies in mathematics.
- To support women with, or desiring careers in, research in mathematics or mathematics related fields.
- To provide a meeting place for these women.
- To foster international scientific communication among women and men in the mathematical community.
- To cooperate with groups and organisations, in Europe and elsewhere, with similar goals.

Our organisation was conceived at the International Congress of Mathematicians in Berkeley, August 1986, as a result of a panel discussion organised by the Association for Women in Mathematics, in which several European women mathematicians took part.

At the time of writing, there are participating members in the following countries:

Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Italy, Latvia, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Switzerland, Turkey, Ukraine, and the United Kingdom;

with contacts in Albania, Brazil, Chile, Egypt, India, Iran, Khirghistan, Nepal, Tunisia, Uzbekistan, the West Bank.

There have been seven European meetings: in Paris (1986), in Copenhagen (1987), in Warwick (England) (1988), in Lisbon (1990), in Marseilles (1991), in Warsaw (1993), in Madrid (1995) and in Trieste (1997). The next meeting will be in 1999 in Hannover, Germany.

The most recent meeting in Trieste included series of lectures on the p-adic numbers, a series on group representations, an interdisciplinary session on symmetries, a poster session, and a discussion entitled "Women in Mathematics, East–West–North–South". We do our best to make the mathematical lectures accessible to mathematicians from other specialties, so that the meetings provide an opportunity for each participant to broaden her mathematical horizon. We have held smaller interdisciplinary workshops in Paris in June 1996 on Renormalization, and in Oxford in July 1998 on Moduli Spaces.

Activities and publicity within each country are organised by regional co-ordinators. Each country or region is free to form its own regional or national organisation, taking whatever organisational or legal form is appropriate to the local circumstances. Such an organisation, *femmes et mathematiques*, exists in France; others are forming in Italy, in the U.K. and in Germany. They have local activities.

There is also a web page:

`http://www.math.helsinki.fi/EWM`,

where you will find the list of regional coordinators as well as the proceedings of the general meeting in Madrid in 95 (and soon those of the Trieste meeting), the yearly Newsletters, access to a bibliography on women mathematicians, and instructions on joining the email network ewm-all.

For further information contact:

The secretary of EWM: Riitta Ulmanen,
Department of Mathematics,
P.O.Box 4 (Yliopistonkatu 5),
FIN - 00014, University of Helsinki, Finland;
e-mail: `ewm@sophie.helsinki.fi`,
Tel 358 9 191 22853, Fax 358 9 191 23213

Laura Fainsilber, convenor of EWM, July 1998.

EMS AGENDA

1998

November 15
Deadline for submission of information or papers to the December issue of EMS Newsletter
Contact: Martin Speller, msp@gcal.ac.uk

November 28–29
Executive Committee Meeting in Copenhagen (Denmark)

1999

February 15
Deadline for submission of information or papers to the March issue of EMS Newsletter
Contact: Martin Speller, msp@gcal.ac.uk

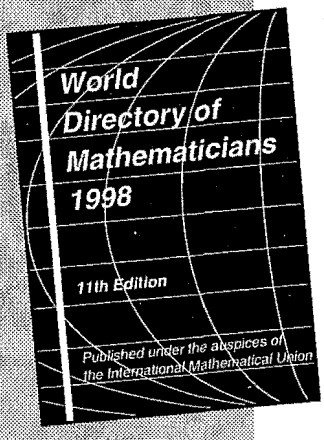
EMS Lectures 3: "Real and Complex Dynamics"
The lecturer will be Professor M. Lyubich, from SUNY Stony Brook (USA). The lectures will be given at Barcelona, St. Petersburg and TU Denmark.

December 3–4
DMF "Mathematics and Music" in Lisbon (Portugal), Paris (France) and Vienna (Austria)
Contact: Mireille Chaleyat-Maurel, mcm@ccr.jussieu.fr

2000

July 10–14
Third European Congress of Mathematics (3ECM) in Barcelona (Spain)
Contact: S. Xambo-Descamps, sxd@grec.upc.es

AMERICAN MATHEMATICAL SOCIETY



World Directory of Mathematicians 1998

This 11th edition of the *World Directory of Mathematicians 1998* incorporates updates and corrections to the 1994 edition, and includes nearly 30 percent more names. Published by the International Mathematical Union, this valuable reference contains the names and addresses of over 50,000 mathematicians from 69 countries. There is also an increase in the number of fax numbers and email addresses in this edition. Listings for the directory are arranged both alphabetically and geographically and are based on information supplied by National Committees for Mathematics (or corresponding organizations). Libraries, mathematics departments, and individuals will find this new edition to be a valuable resource for its extensive coverage of the international mathematical community.

Contents: Preface; Ordering; List of Main Abbreviations; Members of the International Mathematical Union; List of Mathematical Organizations; Alphabetical List of Mathematicians; Geographical List of Mathematicians.

Published by the International Mathematical Union.

1998; 1093 pages; Softcover; List $65;
All individuals $40; Order code WRLDIR/11EMS98

AMS
AMERICAN MATHEMATICAL SOCIETY

All prices subject to change. Charges for delivery are $3.00 per order. For optional air delivery outside of the continental U. S., please include $6.50 per item. *Prepayment required.* Order from: **American Mathematical Society**, P. O. Box 5904, Boston, MA 02206-5904, USA. For credit card orders, fax 1-401-455-4046 or call toll free 1-800-321-4AMS (4267) in the U. S. and Canada, 1-401-455-4000 worldwide. Or place your order through the AMS bookstore at www.ams.org/bookstore. Residents of Canada, please include 7% GST.

Year 2000: World Mathematical Year

Projects

Institutions

International Mathematical Union (IMU) http://elib.zib.de/imu/
Mathematics Tomorrow V. Arnold, M. Atiyah, P. Lax and B. Mazur are coordinating the preparation of a book of articles by prominent mathematicians on how they see the prospects of mathematics in the coming century.
Contact: Jacob Palis, jpalis@impa.br
Web page: http://elib.zib.de/imu/wmy

International Commission for the Mathematical Instruction (ICMI) http://elib.zib.de/imu/icmi/
International Congress on the Teaching of Mathematics (ICME-9) July 31–August 7, 2000, Makuhari/Chiba (Japan)
Contact: Mogens Niss, MN@mmf.ruc.dk
ICMI WMY 2000 Committee
Contact: Miguel de Guzman, mdeguzman@bitmailer.net

International Commission on History of Mathematics (ICHM) http://elib.zib.de/imu/ichm/
Memory of Mathematicians
Creation of a public database containing for each mathematician a description of the locations where original documents concerning him or her are stored.
Contact: Hélène Gispert, Helene.Gispert@ghdso.u-psud.fr

Bachelier Finance Society http://finasto.uni-bonn.de/bachelier/
First World Congress of the Bachelier Finance Society
Organised under the auspices of the Association Française de Finance and of the Société Mathématique de France June 28–July 1, 2000, Paris (France).
Contact: Hèlyette Geman, geman@dauphine.fr

Bernoulli Society for Mathematical Statistics and Probabilities
World Congress of the Bernoulli Society May 15–20, 2000, Guanajato (Mexico)
Five Year 2000 Conferences: Causality, Ecology and Environment, Financial Mathematics, Neural Networks and Learning, Quantum Stochastics, Stochastic Geometry and Imaging
Special Volume of "Bernoulli": this volume will comprise a number of special invited papers that should take stock of the developments in mathematical statistics and probability in the 20th century and speculate about stochastics and its applications in 21st century.
Contact: Ole Barndorff-Nielsen, atsoebn@mi.aau.dk

European Mathematical Society (EMS)
Third European Congress of Mathematics (3ECM) July 10–14, 2000, Barcelona (Spain)
Contact: Sebastia Xambó Descamps, sxd@grec.upc.es

Alhambra 2000 (in collaboration with CIMPA (Nice, France))
European-Arab Congress of Mathematicians (with contributions from historians)

Mathematics posters in the subways of cities all over the world: a gesture towards the general public in the form of small posters on the trains, and larger ones in the stations, showing mathematical subjects of general interest.

Postage stamps: issue of stamps representing European mathematicians. Wherever possible, concerted action between countries or on the European level.
Contact: Vagn Lundsgaard Hansen, V.L.Hansen@mat.dtu.dk

Latin American and Caribbean Mathematical Union (UMALCA) http://umalca.fing.edu.uy/
Latin American Congress of Mathematics August 2000, IMPA, Rio de Janeiro (Brazil) *Contacts*: Roberto Markarian, Mario Wschebor, umalca@fing.edu.uy

South-East Asian Mathematical Society (SEAMS)
Third Asian Mathematical Conference (AMC2000) October 23–27, 2000, Manila (Philippines)
Contact: Polly Wee Sy, pweesy@i-manila.com.ph

Countries

• AUSTRALIA
ASICMI World Mathematical Year 2000 Australia Conference January 10–14, University of Melbourne (Australia)
Contact: Barry McCrae, b.mccrae@edfac.unimelb.edu.au

• BELGIUM

Mathematics posters in the Brussels underground (with the EMS)
Mathematics will be in the Bruxelles underground during two periods of two weeks each.
Contact: Luc Lemaire, llemaire@ulb.ac.be

• CANADA
1. Canadian Mathematical Society (CMS)
Joint meeting of the Canadian Mathematical Society (CMS) and the Canadian Applied and Industrial Mathematics Society (CAIMS) June 2000, McMaster University, Hamilton, Ontario (Canada)
Mathematics posters in the Montréal subway with possible extensions to public transportation in other Canadian cities.
Contact: Bernard Hodgson, bhodgson@mat.ulaval.ca

2. Quebec United Congress of all mathematical associations and groups of Quebec Spring 2000
Mathematics Exhibition
Contact: Richard Pallascio, pallascio.richard@uqam.ca

• FINLAND
Rolf Nevanlinna Colloquium August 8–12, 2000, Helsinki (Finland)
Contact: Pekka Tukia, pekka.tukia@helsinki.fi
Studia Generalia lecture series Autumn 2000; first lecture 1 October 2000, University of Helsinki (Finland)
Contact: Olli Martio, olli.martio@helsinki.fi

• FRANCE
1. French Committee for World Mathematical Year
Mathematics posters in the Paris underground (with the EMS)
This project could exploit the re-fitting of certain tube stations (Monge and Laplace).
Contact: Mireille Chaleyat-Maurel, mcm@ccr.jussieu.fr
Postage stamps A list of mathematicians has been submitted to the Post Office for an issue, in the year 2000, of six stamps portraying French mathematicians.
Contact: Liliane Zweig, zweig@dmi.ens.fr
Mathematics and other fields of knowledge (with the Ecole Normale Supérieure and historians of mathematics)
Re-issue of books out of circulation. In partnership with the CNL (Centre National du Livre), it is planned to re-edit important mathematical works no longer available.
Contact: Martin Andler, andler@math.uvsq.fr
A book "An outlook by women mathematicians". An initiative of the Association "Femmes et Mathématiques".
Film: "Four women mathematicians at the far end of the world" An initiative of the Association "Femmes et Mathématiques".
Contact: Julianne Unterberger, julia.unterberger@univ-reims.fr

2. Ecole Centrale de Lyon / Ville de Sainte Affrique
Conference "Emile Borel" July 16–17, 1999, Sainte Affrique (France)
The history of mathematics in France at the beginning of the 20th century.
Contact: P. Guiraldenq, charrier@cc.ec-lyon.fr

3. Société française de Statistique
XXXIIème Journées de Statistique May 19–24, 2000, Fes (Maroc)
Contacts: Khalid Rifi, estfes@fesnet.net.ma, Jean-Louis Soler, JeanLouis.soler@imag.fr
Second International Conference on Mathematical Methods in Reliability (MMR' 2000) July 4–7, 2000, Bordeaux (France)
Contact: Nikolaos Limnios, Nikolaos.Limnios@utc.fr

• GERMANY
Mathematics and Expo 2000 Summer 2000, Hanover
Various mathematical manifestations on the occasion of Hanover's International Trade Fair
Contact: Klaus Hulek, hulek@math.uni-hannover.de

• IRAN
National Commission for the World Mathematical Year
Among the projects: popularising mathematics, the role of mathematics in development, mathematics education and research in the coming century, publications and the documentation of the history of mathematics in the country.
Contact: S. Shahshahani, shahshah@ipm.ac.ir

• ITALY
Exhibition: "Mathematics in Contemporary Art" March-September 2000, Museo di arte contemporary del castello di Rivoli, Rivoli, Torino (Italy)
Stamp: the proposition to have a commemorative stamp celebrating WMY 2000 was already submitted to the Ministero delle Poste.
RAI Programme "Mathematics in western civilization"

RAI, the Radio-Television National State Broadcasting Company is considering the proposition to produce a series of 3 programmes on "Mathematics in western civilization".
Contact: Alberto Conte, conte@dm.unito.it

• LUXEMBOURG
The development of mathematics: 1950–2000
A collective book retracing the development of mathematics during the second half of the 20th century.
Contact: Jean-Paul Pier, pier@cu.lu

• NORWAY
Joint committee for World Mathematical Year 2000 and Abel Anniversary 2002
Contact: Jens Erik Fenstad, jfenstad@math.uio.no
Web Page: http://www.math.ntnu.no/abel/
Mathematics counts. 33 carriers A book (in Norvegian) to be distributed to highschool students.
Contact: Kari Hag, kari@math.ntnu.no
Conference: Mathematics today February 3–5, 2000, Trondheim (Norway)
Contact: Helge Holden, holden@math.ntnu.no

• PORTUGAL
Macao 2000: Mathematics and its Role in Civilization A joint portuguese-chinese initiative for a congress on a general subject of the scientific and cultural role of the mathematical sciences in the history of civilization and in the future development of humanity. January 11–14, 2000, Macau (China)
Contacts: José Francisco Rodrigues, rodrigue@lmc.fc.ul.pt, Li Ta-tsien, dqli@ms.fudan.edu.cn

• SPAIN
Royal Academy of Sciences
Promotion of Mathematics in Society 60 mathematical lectures for the general public given by 15 distinguished Spanish mathematicians in different cities of the country
Contact: Gregorio Millan, academia@bib.csic.es

• UNITED STATES OF AMERICA
Joint Mathematics Meetings (Joint meeting of the American Mathematical Society, Mathematical Association of America, and Society for Industrial and Applied Mathematics) January 19–22, 2000, Washington, D.C.
Contact: Hope Daly, hhd@math.ams.org
Web Page: http://www.ams.org/meetings/wmy2000.html
Special Meeting on the theme "Mathematical Challenges of the XXIst Century" August 2000
Contact: Felix E. Browder, browder@math.rutgers.edu
Web Page: http://www.ams.org/meetings/wmy2000.html

Third European Congress of Mathematics

Barcelona, July 10–14, 2000

Pre-registration

It is already possible to pre-register for the 3ECM. An electronic form can be found in the Congress web site

`http://www.iec.es/3ecm/`

Otherwise, you may send an e-mail message to `3ecm@iec.es`, or a fax to +34 93 270 11 80 (Societat Catalana de Matemàtiques), giving the following information. This information will be stored in a mailing list for distribution of the first announcement and further information. The official dates for registration for the Congress will be announced later.

Personal Data:	First name, last name, title, phone, fax, e-mail, URL.
Affiliation:	Institution or company, faculty or department, street or P.O. Box, city, country, zip code.
Home Address:	(if appropriate) Street or P.O. Box, city, country, zip code.
Areas of Interest:	Choose one or several items in the list of 3ECM topics.

3ECM Topics

- Logic and Foundations
- Algebra. Number Theory
- Algebraic and Analytic Geometry
- Differential Geometry
- Topology
- Discrete Mathematics and Computer Science
- Modelisation and Simulation
- Ordinary Differential Equations and Dynamical Systems
- Partial Differential Equations
- Functional Analysis
- Complex Analysis
- Probability and Statistics
- Real Analysis
- Mathematical Physics

Satellite Activities

The following is the list of satellite activities to the 3ECM at the present date:

International Functional Analysis Meeting in Valencia, on the Occasion of the 70th Birthday of Professor Manuel Valdivia. Valencia (Spain), July 3–7, 2000. The Scientific Organising and Programme Committee consists of R. M. Aron (Kent State, USA), K. D. Bierstedt (Paderborn, Germany), J. Bonet (Valencia, Spain), J. Cerdà (Barcelona, Spain), H. Jarchow (Zürich, Switzerland), M. Maestre (Valencia, Spain), and J. Schmets (Liège, Belgium).

6th International Conference on Harmonic Analysis. El Escorial (Madrid, Spain), July 3–7, 2000. There will be courses and talks. Invited speakers include A. Carbery (Edinburgh), M. Chirst (Los Angeles), C. Kenig (Chicago), P. Mattila (Jyväskylä), F. Ricci (Torino), P. Sjögren (Göteborg), E. Stein (Princeton), S. Wainger (Wisconsin), G. Weiss (St. Louis). The Organising Committee consists of P. Cifuentes, J. García-Cueva, E. Hernández, J. L. Torrea, F. Soria, and A. Vargas, from the Universidad Autónoma de Madrid.

Instructions for Organisers of Satellite Activities

The Executive Committee of the 3ECM offers the following advantages to organisers of satellite activities:

- A summary of information about each satellite activity will be freely distributed through the printed and electronic means of the 3ECM.
- The reduced registration fee offered to participants of the 3ECM registered before April 2000 will be extended until the beginning of the 3ECM for participants of satellite activities.
- Addresses of participants of satellite activities may be included in the mailing list of the 3ECM for distribution of information.

The Executive Committee requires the following information in order to decide if an activity can be considered as a satellite of the 3ECM:

- Title and a short presentation of the activity (periodicity, objectives, etc.).
- Location and dates.
- Organising Committee and Scientific Committee, if applicable.
- Preliminary list of speakers, if applicable.

The experience from previous EMS conferences and other international events shows that it is also convenient to request the following:

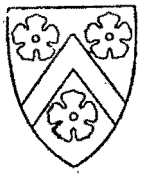
- The dates of satellite activities should be close to the dates of the 3ECM (from 10th to 14th July, 2000).
- People responsible for each satellite activity should provide their participants with information about the 3ECM. In addition, they should assist them in organising their trip from or to Barcelona. The organisers of the 3ECM will also assist 3ECM participants who are registered in some satellite activity in arranging their travel plans.

Homology, Homotopy and Applications

A new international electronic journal in mathematics is launched, entitled "Homology, Homotopy and Applications". Though this journal on homological and homotopical algebra and applications in the mathematical sciences is all-electronic, it will be refereed in traditional manner. It is intended to be a leading journal in mathematics. The method of distribution of the journal is via Internet tools under the following address:

`http://www.rmi.acnet.ge/hha`

The journal is archived electronically and in printed paper format. The journal is free for individuals. Initial issue, Volume 1, early 1999. The journal will be covered by Mathematical Reviews and by Zentralblatt für Mathematik (ISSN 1512-0139). Paper copies of articles are archived at the Razmadze Mathematical Institute library. All articles appearing in the journal have been carefully and critically refereed under the responsibility of members of the Editorial Board.



ALL SOULS COLLEGE
OXFORD

Senior Research Fellowships

All Souls College intends to elect two Senior Research Fellows with effect from 1st October 1999 (or an agreed later date). One Fellowship will be in Law, and one in Mathematics or the Theoretical Life Sciences (both subjects broadly conceived). The Fellowships are open to both men and women.

The College regards a Senior Research Fellowship as being of comparable academic standing to an Oxford University Professorship, and applicants are expected to have a correspondingly distinguished record of achievement in research.

Senior Research Fellowships are normally held until retirement age (subject to renewal by the College every seven years and the requirements of the Education Reform Act, 1988).

Further particulars, including details of emoluments and terms of appointment, application forms, and copies of a memorandum for referees may be obtained from the Warden's Secretary, All Souls College, Oxford OX1 4AL. Applications, on the application form, should reach the Warden no later than Friday 18th September 1998 (the envelope containing the application to be marked "Senior Research Fellowship"). Applicants are asked to ensure that references, from not more than three referees, also reach the Warden by Friday 18th September 1998.

A Brief History of the Belgian Mathematical Society
in two and a half chapters

Luc Lemaire

Chapter 1: The early days (1921–1946)

As I write, I have in front of me two thick notebooks, handwritten between 1921 and 1946 as minutes of the meetings of the Belgian Mathematical Society.

These provide an interesting and nostalgic view of the birth of the Society and of the context of mathematical research at the time.

The first page is dated 14.3.1921, and presents the decision to create a "*Mathematical Circle where all questions concerning pure and applied mathematics would be considered, by lectures, communications and discussions*" (all the quotes here are loose translations of the original French text).

Nine people were present, the best known being Th. De Donder, L. Godeaux and A. Errera.

The next meeting gathered 22 members for adoption of temporary rules and two lectures, by A. Errera and Th. De Donder. The official statutes were adopted in November and the name "Circle" was replaced by "Society" in January 1922.

Here are some excerpts of the statutes:

Article 2: "The aim of the Society is to contribute to the progression and diffusion of mathematics in Belgium. It is concerned with mathematics, pure and applied, in the broadest sense. It will try to establish a permanent link between secondary school and university."

Presumably, these aims could be expressed today in the same way, and the question of relations between pure and applied mathematics, or between the different levels of teaching remain to the present day.

Article 3 states that there will be a meeting every month (except August and September), and article 7 that the membership fee is 10 francs (one quarter of an ecu) for members living in Brussels, but 5 francs (one eighth of a euro) for the others!

These articles survived changes in the statutes in 1923 and 1936. To my knowledge, they were not officially modified before...1998. The fact is that nobody bothered about the statutes (or knew about them)—even when the monthly meetings vanished for lack of participants in the seventies, or when the membership fee rose to the (still cheap) amount of 600 francs (the same for everyone !).

The last article specifies that in case of termination of the society, "the assets are given to the poor". Note that the sentence "*l'avoir est remis aux pauvres*", means to **all** the poor—no definition or algorithm being given to identify them.

At the time, the Society didn't start a journal, but its records appear in brief supplements of a journal of the period: *Mathesis*.

The handwritten minutes describe for every meeting the topic of the lecture and summarise the discussion. Most of the lectures were given by Belgian mathematicians, and it is interesting that they felt the need for these monthly contacts, and maintained them for many years. Some foreign speakers were of course also invited.

Quite regularly, lectures were supplemented by reports on results announced in international congresses, where one (but maybe only one) member was able to go.

Two aspects are striking.

Those monthly meetings were maintained throughout a long period (except during World War 2), and this must reflect a time when information did not flow easily and when meetings were fairly rare.

The subjects treated were extremely varied—and in fact established links between pure and applied mathematics, and between university and secondary school, in a way forgotten today.

Indeed, we find lectures on mathematical physics (with e.g. De Donder), astrophysics (Lemaître), algebraic geometry (Godeaux), analysis (De la Vallée-Poussin, Lepage), engineering (van den Dungen), mathematics of insurance, and secondary school mathematics (with A. Mineur—dearly remembered by generations of Belgian schoolchildren for his treatise on descriptive geometry).

Amongst foreign speakers, let me just pick two curios.

On top of various lectures on integration, Lebesgue gave a talk in 1925 on ruler and compass constructions.

In 1922, Millikan gave a lecture, comparing his ideas on the electron with those of Planck and De Donder. The minutes specify that he was asked a question by Henriot on the capacity of the electron to spin—and that he didn't know the answer.

The notebooks end in June 1946. I don't know if further books were lost or if records were interrupted. This is possible because the Society started the publication of its *Bulletin* the following year.

Chapter 2: The Guy Hirsch Period

The first volume of the "*Bulletin de la Société Mathématique de Belgique*"—a single issue of 46 pages—appeared in 1947–48, but is not called number 1, perhaps because it was unclear whether others would follow. In fact, the numbering starts only with volume 6 in 1953.

Again in 1947, Guy Hirsch was elected deputy secretary, the first step of his lifelong involvement with the Society. Hirsch, a top class topologist (think of the Leray-Hirsch theorem) and philosopher of science, became so active in the Society that for many years one could say he was the Society.

Indeed, from 1953 to 1993, the official address of the Society was that of his apartment, from which he handled all the administration with the help of his wife and son, acting both as secretary and treasurer.

The *Bulletin* had a small editorial board from 1951 to 1955, but it dissolved that year, leaving Guy Hirsch with

the full control of the edition of the Bulletin—a situation that lasted until 1977! After that, the *Bulletin* was split in two series, Hirsch keeping full editorial control of the first one until his death in 1993.

Singlehandedly, he managed to develop the Society, thanks to his huge mathematical culture and his patient work.
A curio for this period is a paper of Lucien Godeaux: *Les recherches mathématiques en Belgique dans ces dernières années*, (1949–50) pp. 32–40, in which he lists what he sees as the best work of the time in Belgium.
I imagine that if such a paper were contemplated today, a committee would sit for two years arguing about choices and get nothing written.

In the seventies, the situation began to change. The monthly meetings vanished for lack of participants—they simply did not fit the needs of the mathematicians anymore.
The mathematical community wanted to take more part in the Society, hence the second series of the *Bulletin*, started by A. Warrinnier and continued by Y. Felix and J.-P. Tignol, with a strict system of editorial boards.
P. Henrard then J. Leroy, with S. Caenepeel as treasurer, took the task of transforming the very personal secretarial system of G. Hirsch (all the exchange programme of the *Bulletin* for 30 years used only 2 pages, filled with color dots) into a well-regulated computerised system.

In the eighties, an annual meeting was launched, and met with great success at the beginning. But again, after a few years, attendance diminished. In the hectic schedule of university people between teaching, research and administration, between numerous specialised meetings and large international conferences, such non-specialised national meetings obviously had no priority, and the Society went looking for another formula.

Chapter 3: The Present Period (up to now)
Since 1994, the Society has a new series of its *Bulletin*, coming from the merger of the two series and of another journal, *Simon Stevin* (globalisation is everywhere in Europe). It works according to a strict refereeing process, and papers on all mathematical subjects can be sent to the main editor Yves Felix (`felix@agel.ucl.ac.be`).
The *Bulletin* publishes 5 issues per year, and on average one supplement.

In collaboration with the National Committee for Mathematics, the Society also runs a Newsletter for its members, and its electronic version on the Society's web site is updated in real time.

A rebirth of the congresses came with the start of a series of joint meetings. The first one with the American, Dutch and Luxemburg mathematical societies brought 500 mathematicians to Antwerp in 1996 (an all time record for Belgium).
The next one, with the London Mathematical Society, will take place in Brussels on May 14–16, 1999 (see the announcement on the web site `http://ulb.ac.be/assoc/bms` for programme and registration forms, or contact `leroy@ulb.ac.be`). In 2001, Liège will host a joint meeting with the Deutsche Mathematiker-Vereinigung.

If there is some lesson to draw from this brief overview, it is probably that when situations change, mathematical societies must adapt. In that sense the B.M.S. today plays its role as it did in 1921—but this role has changed. A modern structure remains modern only for a period.

A Society's function is largely about communication, and nothing changes faster today than communication. Certainly, Chapter 4 of this story will concern every mathematical publisher, and will be about the impact and good use of the possibilities of electronic publishing. An evolution will take place, but I doubt if anybody could describe with certainty the situation that we shall know in 20 years.

Anyway, we are still in the middle of Chapter 3 ...

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EURONEWS

CATALONIA

Centre de Recerca Matemàtica

Guest list for the period September–December 1998:

J. Scherer Algebraic Topology	Zürich	01.09.98–31.08.99
S. van Strien Dynamical Systems	Warwick	01.09.98–10.09.98
R. Devaney Dynamical Systems	Boston	01.09.98–12.09.98
A. van den Essen Dynamical Systems	Nijmegen	01.09.98–10.09.98
J. Los Dynamical Systems	Nice	01.09.98–28.02.99
D. Hartig Dynamical Systems	San Luis	01.09.98–gener 99
L. Cherkas Dynamical Systems	Minsk	15.09.98–15.12.98
B. Coll Dynamical Systems	Palma de Mallorca	15.09.98–30.09.98
E. Pérez-Chavela Dynamical Systems	Mexico	16.09.98–31.10.98
J. Guaschi Dynamical Systems	Toulouse	21.09.98–20.10.98
K. Baranski Dynamical Systems	Warsaw	01.10.98–31.08.99
V. Olevskii Analysis	Paris	01.10.98–31.08.99
I. Morrison Algebraic Geometry	New York	01.10.98–31.01.99
H. Giacomini Dynamical Systems	Tours	01.10.98–15.11.98
B. Branner Dynamical Systems	Lyngby	12.10.98–06.11.98
D. Iesan Applied Mathematics	Iasi	15.10.98–15.12.98
W. Li Dynamical Systems	Beijing	15.10.98–15.12.98
Z. Zhang Dynamical Systems	Beijing	15.10.98–15.12.98
E. Lacomba Dynamical Systems	Mexico	21.10.98–01.12.98
Ch. Li Dynamical Systems	Beijing	01.11.98–14.11.98
G. Valla Algebra	Genova	01.11.98–30.11.98
J.A. Rodriguez Dynamical Systems	Oviedo	02.11.98–15.12.98

GEORGIA

Tbilisi International Centre of Mathematics and Informatics (TICMI)

ANNOUNCEMENT FOR 1999

Advanced Course on Function Spaces and Applications
Date: 6–13 September, 1999
Location: TICMI (Tbilisi)
Vakhtang Kokilashvili (Razmadze Mathematical Institute, Georgian Academy of Sciences, Georgia)

New Aspects in Weight Theory

Summary: The weight problems have been become one of the most dynamically parts of harmonic analysis. Solutions of many important problems have been closely linked with these problems. In the lectures we are going to present a survey of recent results concerning of the following problems: Two-weight criteria of boundedness and compactness in Banach function spaces; Criteria of bounded and compact imbeddings of Sobolev (Liouville) space into Lebesgue space, generally speaking, with different weights; Two-weight estimates for singular integrals and applications to PDE (5 hours).
Alois Kufner (Mathematical Institute, Academy of Scinces, Czech Republic)

Hardy's Inequality and Related Topics

Summary: Higher order Hardy inequalities (i.e. containing higher order derivatives) with various types of function classes, among others with overdetermined and underdetermined boundary conditions, with mixed and combined boundary conditions as well as with conditions inside the definition interval. Hardy type inequalities with different norms. Fractional order Hardy inequalities, via interpolation theory as well as direct approaches. Higher-dimensional analogues of Hardy's inequality and "multiple" weighted norm inequalities. Application to boundary value problems for linear and nonlinear elliptic operators, in particular, the connection with spectral problems.
Coordinator: George Jaiani
This course is suitable for advanced graduate students or recent Ph.Ds. The participants will also have an opportunity to give 20-minute talks on their own work at a mini-symposium which will take place during the Advanced Course. Lectures and abstracts of the talks will be published and distributed among the lecturers and participants after the Advanced Course. The registration fee for participants is 400 USD which includes all local expenses during the Advanced Course. A restricted number of participants will be awarded grants.

Further information: TICMI, I.Vekua Institute of Applied Mathematics of Tbilisi State University, University Str. 2, Tbilisi 380043, Georgia
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UNITED KINGDOM

Report on the 11th International Conference on Domain Decomposition Methods

The 11th International Conference on Domain Decomposition Methods was held at the Avery Hill Conference Centre, University of Greenwich, London from 20th to 24th July, 1998. Technical talks began at 9:00am immediately after the welcome speech given by the Vice Chancellor, Dr David Fussey.

The Conference began with the same daily format on Monday, Tuesday and Thursday. The format consisted of morning sessions and afternoon sessions. Each morning/afternoon session consisted of two keynote papers followed by contributed sessions and minisymposia to be run as Parallel Sessions. Most morning sessions consisted of two Parallel Sessions and afternoon sessions consisted of three Parallel Sessions. On Wednesday, the morning session was reserved for the Graduate Paper Competition and the afternoon was a lecture free afternoon. On Friday, the morning session had the same format as on Monday and the Conference ended at about 3:10pm after two keynote papers in the afternoon session. All keynote papers were of 30 minutes each and all other contributions were of 20 minutes each.

Apart from papers on theory and analyses and algorithm development, as appeared in previous Conferences of this series, one major feature of this Conference was the increase in the number of papers on industrial applications and parallel computing applications. There were sixteen keynote papers delivered by internationally well known scientists and mathematicians in the general area of domain decomposition with just under half of these papers being related to industrial applications.

The keynote papers were: "Domain decomposition solvers for incompressible fluid flow" by E M Ronquist, "Sound propagation near wedge-shaped pine in the water" by H Kawarada, "Adaptive multilevel FEM as decisive tools in the clinical cancer therapy huperthermia" by P Deuflhard, "FETI - H: A scalarable domain decomposition method for the solution of high frequency exterior Helmholtz problems" by C Farhat, "Recent development of overlapping Schwarz methods and applications in compressible flow simulations" by X-C Cai, "Some recent applications of domain decomposition methods to flow problems" by A Quarteroni and "Overlapping Schwarz methods for the Helmholtz equations" by M Casarin. There were two philosophical keynote papers on the use of parallel/distributed computers entitled "How scalable is domain decomposition in practice?" by D E Keyes and "Distributed optimisation CFD problems using domain/boundary decomposition methods: Genetic algorithms and game theory" by J Periaux.

Papers involving parallel computations were "Parallel unstructured tetrahedral mesh algorithms for transient compressible and reacting flow problems using domain decomposition" by M Berzins, "Hybrid boundary element methdos in 3D" by I G Graham. Papers involving numerical analysis were "Domain decomposition for h-p finite element approximation" by M Ainsworth, "Preconditiong operators for elliptic problems with bad parameters" by S Nepomnyaschikh, "Adaptive multilever finite element methods in domain decomposition on nonmatching grids" by R Hoppe, "Enhanced convergence rate from asymptotic expansions in domain decomposition" by B Enquist "Domain decomposition methods for non-symmetric problems" by F Nataf.

One new feature of this Conference of the series was the Graduate Paper Competition. There were originally 19 graduate abstracts submitted. Eventually, some students dropped out for one reason or another and there were 13 papers at the final competition which took place on the Wednesday morning. The Judging Committee consisted of M Cross (Chair), I G Graham, J E Roberts, O Widlund and J Xu. Three presentations were nominated by the Judging Committee. Each of these three students received a prize in the form of a contribution to his/her international air ticket. All students who submitted abstracts for the Graduate Paper Competition received accommodation subsistence and a lower registration fee.

Another major feature of this Conference was minisymposia. Proposals for organising minisymposia were considered by the Local Organising Committee as early as one year before the Conference. The idea was to allow topics of common interests to be brought under the same minisymposium so that participants could see clearly the aims and objectives of the talks under the minisymposium.

There were six minisymposia, namely:
(1) Parasol (by P Bjorstad),
(2) Towards black box routines for parallel and distributed computing (by F Nataf),
(3) Sparse grid methods (by M Griebel and H-J Bungartz),
(4) Non-linear problems (by M Espedal and X-C Tai),
(5) Porous media (by J E Roberts), and
(6) Viscous-inviscid coupling (by C-H Lai and A E P Veldman).

Minisymposium organisers were responsible to receive, review and accept abstracts.

The Organising Committee found that minisymposia are particularly suitable for people interested in the same topics. A panel discussion time was allowed at the end of each minisympoisum. There were a total of 36 papers presented at the above minisymposia.

As in most conferences, this Conference also held Parallel Sessions. As usual, the abstracts in this case were solicited by the Local Organising Committee. Main areas included were: theory and analysis, algorithms, applications and implementation, higher order schemes, mesh and problem partitioning, computational fluid dynamics, structural meachanics, computational aeroacoustics, unsteady parabolic problems, eigenvalue problems and coupling of fields. In addition to the minisymposium papers, there were 99 contributed papers after the cancellation of 3 papers and with the substitution of one late paper.

There were 135 people registered with the Conference and around 90 participants attended the last afternoon session

on Friday. These participants came from 25 different countries. The UK, France, Germany and the US had the largest number of delegates. There were also delegates from Oman, Algeria, Estonia, Czech Republic and Israel who have not appeared in the previous Conferences as far as this participant's knowledge is concerned. A Welcome Reception was held on Monday evening at the Winter Garden, Avery Hill Campus. The Conference Banquet was held on Wednesday evening at the Trafalgar Tavern which sits along side the River Thames, right at the centre of historical Greenwich.

This Conference was funded by the Engineering and Physical Sciences Research Council of the United Kingdom. The funding was used to support the invited speakers, graduate students and minisymposium organisers in covering their accommodation and some of the international fares and local transportation fares. The American Pacific Technology Group Ltd, which is based in Hong Kong, also supported two scientists from the Academia Sinica, Beijing for attending the Conference and a week of visit at the University of Greenwich after the Conference.

The next Conference of this series is to be held at Chiba University, Japan in October 1999.

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Scientific Report of the Summer School "Wavelets in Analysis and Simulation"

(Orsay, France June 29–July 10, 1998)

This summer school was intended to provide the students with

- an overview of the theory of wavelet bases and related multiscale tools (e.g. multiresolution analysis, hierarchical bases, iterated filter banks)
- a deep understanding of its applications in analysis (e.g. signal processing) and simulation (e.g. scientific computing)
- a practical experience of the numerical implementation of these applications

This triple goal was met, thanks to the three main components of the schools: a basic course on general theory (12 hours: 9 in the first week and 3 in the second week), seven more specialised thematic courses (each of them between 3 and 6 hours) and computer sessions (4 sessions of 3 hours).

Concerning the specialised thematic courses, the first week of the school was essentially concentrated on applications in analysis (courses of Jaffard, Mallat, Perrier 1st part, Meyer). while the second week addressed the applications to numerical simulation (courses of Oswald, Perrier 2nd part, Canuto, Schwab). Accordingly the computer sessions of the first week were mostly oriented toward the situation where wavelets are used to analyse data, whereas in the second week the same tools where used to represent and compute unknowns. This ordering was somehow natural since the second aspect is usually more complex and require some preliminary practice.

Nevertheless, one of our goals was that some interactions occur between students and lecturers whose specialism did not lie in the same applications. Indeed we believe (and this is very much confirmed by the developments of wavelet and multiscale methods) that many new ideas can come out from the interactions between different fields. A good indicator that this goal was also met is that among the approximately 80 students that registered for the school, more than 60 actively attended both weeks (although it was possible to register for one week only). Discussions with these students confirmed that they had benefited greatly from lectures dealing with subjects which did not belong to their main area of investigation.

Let us now detail the different components of the summer school.

Basic Course

The course started with two basic examples of multiscale bases (the Haar system and the Schauder hierarchical basis) before entering the general theory and construction of wavelet bases. A particular focus was upon the examples that were the most relevant for applications in analysis and simluation. Then, the course concentrated on the main approximation theoretic results that connect the analytical properties of a function (typically global or local smoothness) with the rate of decay of the error in some given metric, when this function is replaced by its N first wavelet coefficients (linear approximation) or by its N largest wavelet coefficients (nonlinear approximation).

Thematic courses

The course of S. Jaffard (5 hours) began with an introduction of the multifractal formalism (introduced in the study of turbulence in Frish and Parisi) and then concentrated on the use of wavelets for the analysis of multifractal objects.

The course of S. Mallat (5 hours) first addressed the general problem of finding efficient representations of signals and images in order to solve a given problem. It then gave an overview on the applications to image de-noising and compression, showing the possibilites and inherent limitations of wavelet methods.

The course of Y. Meyer (3 hours) was a very nice connection between pure analysis (discussion of a result concerning the wavelet representation of the space BV in two space dimensions) and image processing. This was a slight modification to the original program, owing to the excitement of demonstrating a new result.

The course of V. Perrier (6 hours) concentrated during the first week on the application of the continuous wavelet transform to the analysis of turbulent flows, whereas the second week was devoted to the simulation of such flows by wavelet based discretisations.

The course of P. Oswald (6 hours) started from the point of view of subspace-splitting, which gives a common framework to domain decomposition and multigrid methods, and went progressively into details concerning the construction of efficient multilevel preconditioners for elliptic problems, based either on wavelets or hierarchical finite elements.

The course of C. Canuto (6 hours) began with the description of a domain decomposition approach to the construction of wavelet bases in complicated geometries. Then, it gave a survey of stabilisation methods for convexion dominated and non-coercive problems, with an emphasis on the use of multiscale methods.

The course of C. Schwab (4 hours) gave an introduction to boundary integral equations, explaining why in certain situations they reformulate partial differential equations in a way that is preferable for scientific computing. It was then devoted to demonstrate how the use of wavelet discretisations allows us to compress the matrices arising from such equations, yielding fast resolution algorithms.

Exercise and Computer Sessions

The two first computer sessions (2 times 3 hours), organised by J. Kalifa with Matlab support, made the students familiar with the practical application of multiscale transformation algorithms in the context of signal and image processing. The two last sessions (2 times 3 hours), organised by R. Masson with Fortran support, were devoted more to the effective programmation of mutiscale preconditioners for the discretisation of elliptic problems.

During these sessions, the students were divided into two groups. While one group was working on computers, the other group had exercise sessions (organised by R. Masson, A. Cohen and P. Oswald) on the topics discussed in the main lectures.

BRIEF REVIEWS

Edited by Ivan Netuka and Vladimír Souček. Books submitted for review should be sent to the following address: Ivan Netuka, MÚUK, Sokolovská 83, 186 75 Praha 8, Czech Republic.

Sir M. Atiyah, D. Iagolnitzer: Fields Medallists' Lectures, World Scientific Series in 20th Century Mathematics, vol.5, World Scientific, Singapore, 1997, x+632 pp., GBP 60.00, ISBN 9-810-23102-4, ISBN 9-810-23117-2

The field of mathematics is too broad nowadays to be understood fully by a single person. Nevertheless, it is very important for every mathematician to try to keep fresh his orientation in the world of mathematics and to see main streams of its evolution at least on a broad scale. The Fields medallists' lectures is a book that can serve this purpose well. The number of Fields medal laureats is 38 in total now (it will change in August), and the work of 22 of them is reviewed in this book. The reader can therefore find here an overview of more than half of the contributions to the development of mathematics which were chosen as significant by the mathematical community itself. Information concerning the 22 Fields medal recipients consists of the address by a leading mathematician introducing the work of the laureat at the prize ceremony of the corresponding Congress, a biographical note (or an autobiography) and paper(s) chosen by the recipient of the prize. These papers are either connected with the main contribution at the time of ceremony or with later interests of the laureat. Some of them are written especially for the volume and contain up to date reviews of a corresponding field (e.g. those written by L.Hörmander, S.Novikov, D.Mumford, G.A.Margulis, A.Connes and J.Bourgain). More personal features (often quite interesting) are contained in a few personal autobiographies (L.Alhfors, R.Thom, L.Hörmander, D.Mumford) or in the mathematical autobiography by S.Novikov. It is without any doubt that this volume should have a place in any mathematical library. (vs)

J.F.Jardine: Generalized Etale Cohomology Theories, Progress in Mathematics, vol.146, Birkhäuser, Basel, 1997, x+317 pp., DM 118.00, ISBN 3-764-35494-1, ISBN 0-817-65494-1

This is a highly specialized monograph. Its main aim is to present a proof of Thomason's étale cohomology descent theorem for Bott periodic K-theory. Here the author successfully realizes his project to prove Thomason's theorem within the framework of the homotopy theory of presheaves of spectra on étale sites. The author follows the general idea of Thomason's original proof, but technically his proof is completely new. In fact, the major part of the monograph prepares the necessary technique for this proof. But we must remark that it is a new, very interesting, and nontrivial technique which is mostly of independent interest. The monograph introduces the reader to current research around Thomason's theorem. The author also proves the Nisnevich descent theorem for the K-theory of separated regular Noetherian schemes, and discusses the Lichtenbaum-Quillen conjecture. The text is carefully and nicely written, and the book reads well. Some prerequisites are obviously necessary for a successful understanding of the monograph, more from algebra than from algebraic topology. It will be interesting especially for mathematicians working in algebraic K-theory and related fields. (jva)

J.Jost (Ed.): Geometric Analysis and the Calculus of Variations for Stefan Hildebrandt, International Press, Boston, 1996, 383 pp., $ 42.00, ISBN 1-571-46037-3

The volume is dedicated to Stefan Hildebrandt on the occasion of his 60th birthday. Research work of this outstanding mathematician is concerned with various aspects of the calculus of variations including existence and regularity problems for harmonic mappings and minimal surfaces and, more generally, with geometric calculus of variations. The rich collection contains 17 papers which reflect recent progress in the field. Among the authors are U.Dierkess, G Huisken, F.Duzaar, K.Steffen, C.Gerhardt, Min-Chun Hong, J.Jost, M.Struwe, N.M.Ivochkina, Mi Lin, N.S.Trudinger, N.Korevaar, L.Simon, E.Kuwert, Fang Hua Lin, S.Müller, V.Šverák, B.Nelli, J.Spruck, P.H.Rabinowitz, F.Sauvigny, A.J.Tromba, H.C.Wente, B.White and R.Ye, this list alone indicating the importance and quality of the contributions. The book starts with a brief outline of S.Hildebrandt's scientific curriculum and a list of his Ph.D. students. A list of his 90 publications is added at the end of the book. The book is recommended not only to everybody working in the field but also to those interested in the calculus of variations and its connections with geometry and analysis. (jsta)

V.Jones, V.S.Sunder: Introduction to Subfactors, London Mathematical Society Lecture Note Series, vol.234, Cambridge University Press, Cambridge, 1997, xii+162 pp., GBP 22.95, ISBN 0-521-58420-5

Starting with work of V.F.R.Jones in 1984, a surprising relationship among solvable models in statistical mechanics, the theory of von Neumann algebras, quantum groups and knot invariants was discovered and caused a lot of excitement. The subject of this book is closely related to this theme: it describes selected topics from operator algebra theory connected with it. The book concentrates on

II_1 factors (mostly hyperfinite ones) and on their subfactors and their corresponding Jones' index. The reader can find here a short summary of basic facts concerning von Neumann algebras, definition of the index of subfactors, a description of the important notion of the basic construction, principal graph invariants of a subfactor, commuting squares, a discussion of a rich class of examples of subfactors (braid group example, vertex and spin models) as well as the original derivation of the one variable polynomial invariants of knots. Most of results are proved (main exceptions being basic facts contained in the first chapter). The book is compact and well written, it can be used as a quick introduction to the subject for mathematicians interested in the recently discovered rich structures inspired by contemporary mathematical physics. (vs)

V.I.Arnold, I.M.Gelfand, M.Smirnov, V.S.Retakh (Eds.): Arnold-Gelfand Mathematical Seminars: Geometry and Singularity Theory, Birkhäuser, Boston, 1997, vi+437 pp., DM 178.00, ISBN 3-764-33883-0, ISBN 0-817-63883-0

This book brings a collection of papers published jointly under the heading of two famous and influential seminars– the Arnold seminar and the Gelfand seminar. There are 20 papers altogether in the volume. The traditional topics from the Arnold seminar (singularities and their applications, geometry of curves and surfaces) are discussed in papers written by F.Aicardi; S.Anisov; V.Arnold; I.A.Bogaevski; Yu.V.Chekanov; S.Chmutov and S.Duzhin; V.V.Goryunov; L.Guieu, E.Mourre and V.Yu.Ovsienko; S.M.Gusein-Zade and S.M.Natanzon; M.É.Kazarian; and V.D.Sedykh. Themes from the Gelfand seminars (generalized Radon transform, nonlinear Fourier transform, integrable equations and hypergeometric series) appear in papers by J.C.Alvarez, I.M.Gelfand and M.Smirnov; A.S.Fokas, I.M.Gelfand and M.V.Zyskin; I.M.Gelfand, M.I.Graev and A.Postnikov; A.Kasarnovski-Krol; and B.Shapiro, M.Shapiro and A.Vainshtein. Moreover, there are papers by M.Karoubi on the Steenrod operations and by F.Lalonde and D.McDuff on positive paths in the symplectic group. In this collection, there are many inspiring new ideas for readers in many branches of mathematics. (jbu)

Ya.G.Sinai (Ed.): Mathematical Problems of Statistical Mechanics. Collection of Papers, Advanced Series in Nonlinear Dynamics, vol.2, World Scientific, Singapore, 1994, viii+353 pp., GBP 29.00, ISBN 9-810-20552-X, ISBN 9-810-20553-8

This volume contains a selection of papers from mathematical statistical mechanics and, in particular, from the theory of phase transitions of the first kind. Several important papers from the last 25 years are collected together in this volume. Except for the papers by G. Gallavotti, J. Ginibre, J. Fröhlich and E. H. Lieb, the emphasis is mainly on authors related to the Moscow seminar in mathematical statistical physics. This book could serve as a very useful reference for mathematicians and physicists working in the field of phase transitions. (mzah)

A.L.Carey, M.K.Murray (Eds.): Geometric Analysis and Lie Theory in Mathematics and Physics, Australian Mathematical Society Lecture Series, vol.11, Cambridge University Press, Cambridge, 1998, ix+290 pp., GBP 24.95, ISBN 0-521-62490-8

This book consists of six survey papers on topics arising from recent exciting interactions between mathematics and theoretical physics. Quantum groups form a new and very important topic in mathematics. The longest contribution in the book (written by A.Ram) offers a useful compact survey of basic facts connected with quantum groups. Motivations, definitions, examples and basic theorems are described in a nice and condensed way, with references to more complete treatments and proofs. The chapter on the integer quantum Hall effect (written by P.J.McCann) starts with a motivation coming from physics and it describes C^*-algebra models. The main mathematical tools are twisted cross products C^*-algebras, K-theory of C^*-algebras and non-commutative Chern characters, Fredholm modules and analytical indices. Equivariant cohomology, symplectic geometry, the convexity theorems and the Duistermaat-Heckman theorem and moduli space of vector bundles on Riemann surfaces are subjects of a short contribution by L.C.Jeffrey and F.C.Kirwan. The contribution by P.Bouwknegt and K.Shoutens discusses various formulae for characters of integrable modules of the affine Lie algebra $\widehat{sl_n}$. Von Neumann algebras appear once more in the survey paper by V.Mathai on new L^2 invariants and the L^2 torsion. The last overview (O.Foda,B.Leclerc,M.Okado,J.-Y.Thibon,T.A.Welsh) describes relations between two apparently unrelated fields in physics and mathematics - a class of exactly solvable 2-dimensional statistical models and the representation theory of highest weight modules of Hecke algebras. The presented selection of the best survey lectures among many graduate workshops held in Adelaide treats very interesting topics for current research and can be recommended to all readers interested in this modern field of mathematics. (vs)

J.Jost: Postmodern Analysis, Universitext, Springer-Verlag, Berlin, 1998, xvi+353 pp., 13 fig., DM 58.00, ISBN 3-540-63485-1

In the preface of his book the author tries to explain the connotation of the adjective "postmodern" and what is the difference from "modern analysis". He concludes that his intention was "to give a coherent introduction to advanced analysis without abstractions for its own sake that builds a solid basis for the areas of partial differential equations, the calculus of variations, functional analysis and other fields of analysis, as well as for their applications". This book provides a reasonable introduction to advanced analysis at the beginning graduate level that blends a modern presentation with concrete examples and applications. It starts with calculus for functions of one real variable (limits, continuity, differentiability) and continues with

elements of functional analysis (Banach and metric spaces including Banach fixed point and Arzelà-Ascoli theorems). There follows a chapter on calculus in Euclidean and Banach spaces (including the implicit function theorem, curves in Euclidean spaces and vector fields). In the next chapter, the Lebesgue integral in Euclidean spaces via semicontinuous functions is introduced. The classical approach culminates with Fubini and Jegorov theorems, Jensen inequality and change of variable formula. Then the author introduces carefully and in detail L^p and Sobolev spaces (Poincaré inequality, Rellich-Kondrachov theorem). The last part of the postmodern analysis book is an introduction to the calculus of variations and elliptic partial differential equations. Let us mention the following as a sample: a weak convergence in Hilbert spaces, Banach-Saks lemma, Dirichlet's principle, Euler-Lagrange equations, Hamilton's principle, regularity of weak solutions, the maximum principle of E. Hopf, Liouville theorem and the eigenvalue problem for the Laplace operator. The book can be warmly recommended to graduate students and to others interested in analysis. (jl)

V.Kac: Vertex Algebras for Beginners, University Lecture Series, vol.10, American Mathematical Society, Providence, 1997, viii+141 pp., GBP 18.50, ISBN 0-821-80643-2

In recent years, two-dimensional conformal quantum field theories have been studied by theoretical physicists from many points of view and a large amount of material has been accumulated in this subject as a result of this study. Axioms for a vertex algebra were formulated by R.Borcherds as a mathematical description of the main object of study. This small book by V.Kac brings another, simpler set of axioms for vertex algebras, shows its relation to Borcherds' ones and brings a rigorous definition of the operator product expansion (OPE) and the related calculus together with many examples. By way of introduction, axioms for the vertex algebra are briefly deduced from the classical Wightman axioms for quantum field theory. The quantum fields are modeled by formal distributions; their calculus is developed in the second chapter. Wick's theorem and its generalizations are described in the third chapter. The structure of vertex algebras is then studied, and various examples of vertex algebras and some of their applications are described in the fifth chapter. The book also contains a discussion of conformal superalgebras. It is an important addition to the literature on the subject, and will be very useful for mathematicians willing to learn more about conformal field theory. (vs)

Y.Gliklikh: Global Analysis in Mathematical Physics. Geometric and Stochastic Methods, Applied Mathematical Sciences, vol.122, Springer-Verlag, New York, 1997, xv+213 pp., DM 88.00, ISBN 0-387-94867-8

This book is a revised and expanded version of that with title "Analysis on Riemannian manifolds and some problems of mathematical physics", which was published in Voronezh (in Russian) in 1989. There are three main interrelated topics discussed — clasical mechanical systems with finite degrees of freedom; stochastic processes and stochastic calculus on manifolds, Langevin equation and the Nelson stochastic mechanics; and finally applications of infinite dimensional differential geometry of the diffeomorphism group to hydrodynamics. The required notions from differential geometry (connections and covariant derivatives) and from the theory of stochastic processes (Markov processes, martingales) are briefly reviewed in appendices. The mentioned topics are treated in the book from a unified point of view based on various invariant forms of the Newton equation and on methods coming from differential geometry. The book covers a broad spectrum of problems and concentrates on existence, uniqueness and qualitative behaviour of solutions. (jbu)

V.Guillemin, E.Lerman, S.Sternberg: Symplectic Fibrations and Multiplicity Diagrams, Cambridge University Press, Cambridge, 1996, xiv+222 pp., GBP 29.95, ISBN 0-521-44323-7

Any irreducible finite dimensional representation of a simple Lie group can be decomposed into a sum of one dimensional weight spaces which are irreducible representations of a chosen Cartan subgroup. T computation of their multiplicity is a classical problem in representation theory. There is, for example, the Kostant formula, or they can be computed inductively using the Freudenthal formula. Nevertheless, their effective computation is very difficult due to the size of the Weyl group in higher dimensions. This book contains a study of asymptotic behaviour of multiplicities and of general patterns and special behaviour of the corresponding multiplicity diagrams. The most remarkable feature of the book is a method used for the study that comes from the apparently quite different field of symplectic geometry. The bridge between both fields is the Kirillov, Kostant and Souriau classification of the irreducible representations by certain coadjoint orbits. They carry natural symplectic structures and symplectic fibrations of one such orbit over another are used to explain a special behaviour of the corresponding multiplicity diagrams. The book contains a wealth of interesting material. It starts with an overview of the theory of symplectic fibrations and with examples of such fibrations involving coadjoint orbits. There is an exposition of the Duistermaat-Heckman theory and many illuminating examples computed in lower dimensional cases. Three appendices contain the proof of the Kostant and Steinberg multiplicity formulae, basic facts of equivariant cohomology (including the derivation of the Duistermaat-Heckman fomula from the Berline-Vergne localization) and comments on current progress in the field. The book is a very interesting survey of a rapidly developing field of research and it is certainly worth of the effort needed to read and to understand it. (vs)

H.Kunita: Stochastic Flows and Stochastic Differential

Equations, Cambridge Studies in Advanced Mathematics, vol.24, Cambridge University Press, Cambridge, 1997, xiv+346 pp., GBP 19.95, ISBN 0-521-59925-3, ISBN 0-521-35050-6
The subject of stochastic differential equations and stochastic flows originated from the Itô calculus. The purpose of this book (it appeared also as a hardback) is to give a systematic and detailed treatment of these and related topics. The book is intended for advanced courses in probability theory or for self study and the author had a great impact on the development of the material presented here. The book starts with an introduction to stochastic processess and random fields and contains a description of continuous semimartingales, semimartingales with spatial parameters and their connections to stochastic integrals, stochastic flows (with Itô formulas), convergence of stochastic flows and stochastic partial differential equations (with applications to nonlinear filtering theory). (mzah)

M.Marx, L.Polos, M.Masuch (Eds.): Arrow Logic and Multi-Modal Logic, Studies in Logic, Language and Information, CSLI Publications, Stanford, 1997, xiv+247 pp., GBP 14.95, ISBN 1-575-86024-4, ISBN 1-575-86025-2
Arrow logic can be seen as a modal logic with three modalities which enrich a propositional language: a modality for composing arrows, for taking the inverse of an arrow and the constant denoting the identity arrow. A meaning of an arrow is most frequently understood as a transition of one information state to another. A "square semantics" is a basic one for this logic; here the arrows are interpreted as ordered pairs of a full Cartesian product U x U. The book consists of two parts. The first treats questions connected with decidability, finite axiomatizability, Craig interpolation and Beth definability. Relations with propositional dynamic logic and Lambek calculus are discussed too, and the Sophia approach to arrow logic, emphasising multi-graphs as models for arrows, is also presented. The second part of the volume is devoted to the "arrow logic analysis", which is a program endeavouring to find new versions of usual undecidable logics which have desirable properties—especially decidability—and which are yet suitable for applications. Motivations, applications and connections with relation algebras are presented. The book, in fact, equips the reader with a good understanding of the subject. (jml)

A.F.Beardon: Limits. A New Approach to Real Analysis, Undergraduate Texts in Mathematics, Springer-Verlag, Berlin, 1997, ix+189 pp., DM 58.00, ISBN 0-387-98274-4
The first two chapters *Sets and functions* and *Real and complex numbers* are standard. Then the limit with respect to a direction is introduced and several theorems requiring completeness of **R** are proved. The first (and the last) difference from the usual description lies in an early treatment of generalized sums $\sum_{x\in X} f(x)$ which makes the subsequent exposition somewhat shorter. It is followed by the Cauchy product of absolutely convergent series and elementary properties of iterated sums. Exponential and trigonometric functions as well as the argument are introduced in **C**, logarithm and a^b are treated for reals. Other parts are again relatively standard except that some of them are usually covered later; examples: the fundamental theorem of algebra, uniform convergence, differentiation of series of functions. The final chapter is devoted to π, γ, e and $n!$; irrationality of π (Niven's proof) and the Stirling formula are proved. The notation used for upper and lower integrals is somewhat confusing (the symbol $\int_{-a}^{b} f$ for the lower integral from a to b is used). The book could be recommended to students as review material before exams. (jve)

E.B.Davies: Spectral Theory and Differential Operators, Cambridge Studies in Advanced Mathematics, vol.42, Cambridge University Press, Cambridge, 1996, ix+182 pp., GBP 16.95, ISBN 0-521-58710-7, ISBN 0-521-47250-4
This is a concise introduction to the spectral theory of partial differential equations, and in particular to the theory of second order elliptic operators. The book can be used either for self-study or as a course text; the prerequisites being an elementary introduction to functional analysis and some measure theory. The book contains some interesting new proofs and presents a concise and nicely written introduction to many important areas of this vast mathematical discipline. The main topics treated in the book are translation invariant operators (distributions, Fourier transform, etc.), variational methods, Schrödinger operators, and the Dirichlet and Neumann boundary conditions. This short book (180 pages) will be very useful both to students and researchers working in related areas of mathematics and physics. (mzah)

T.Needham: Visual Complex Analysis, Clarendon Press, Oxford, 1997, xxiii+592 pp., GBP 32.95, ISBN 0-198-53447-7
The book offers a radically changed first course in complex analysis. In the style of Newton's Principia, it uses the power of elementary geometrical arguments. The aim of the book is the reader's understanding of the subject; perhaps it is comparable with Feynman's lectures in Physics. At every point it asks 'why' and finds a beautiful visual answer (a sort of mismanner in contemporary mathematical literature). The book includes Möbius transformations, non-Euclidean geometry and other topics rarely found in elementary courses, explained without computations. The treatment is not only more appropriate for understanding, but even more effective. I believe that this book can make every student understand and enjoy complex analysis. If its methods could be applied in teaching more generally, mathematics would become a flourishing subject. (pš)

R.Merris: Multilinear Algebra, Algebra, Logic and Applications Series, vol.8, Gordon and Breach Science Publishers, Amsterdam, 1997, viii+332 pp., GBP 59.00, ISBN 9-056-99078-0

The monograph deals with multilinear algebra, with particular emphasis on applications to representation theory of groups, graph theory, enumeration theory, and quantum mechanics. This approach requires an extended preliminary part comprising four out of eight chapters of the text. This part concerns partitions, inner product spaces, permutation groups and group representation theory over C. In the latter setting, equivalence classes of representations correspond to characters, so the focus is naturally on Schur's character theory. Next two chapters deal with tensor spaces and symmetry classes of tensors, with applications to enumeration theory (including Pólya's Theorem on pattern inventory), and NMR spectroscopy (computing nuclear spin characters). Chapter 7 concerns generalized matrix functions. These comprise the determinant, permanent, and Hadamard's function, as particular cases. Starting from classical results of Schur the author quickly gets to points of recent research. For example, the Permanental Dominance Conjecture is discussed, saying that for each positive semidefinite hermitian matrix $A \in M_n(C)$ and each irreducible character χ of a subgroup G of S_n, the permanent of A is greater than or equal to the value in A of the normalized generalized matrix function afforded by χ. The book culminates in Chapter 8 on rational representations of GL(n,C). Here, classical Schur polynomials reappear, in the role of characters associated with the representations. Again, applications are presented, this time to computing the number of nonisomorphic graphs. There are Exercises and Application Exercises following each chapter. Many explicitly computed examples throughout the text, and carefully selected applications, make the book valuable not only for pure mathematicians, but also for a wide range of specialists in applied mathematics and theoretical physics. (jtrl)

G.Buskes, A. van Rooij: Topological Spaces. From Distance to Neighborhood, Undergraduate Texts in Mathematics, Springer-Verlag, Berlin, 1997, xi+313 pp., 151 fig., DM 68.00, ISBN 0-387-94994-1

This book is suitable for real beginners in general topology. It starts by explaining the topology of the line and of the plane, and then moves via metric spaces to topological ones. Most of the 19 chapters have a section of exercises (both illustrative and supplementary) and an extra section describing either an interesting mathematical feature (like Mazur game, p-adic numbers, knots, nonstandard mathematics, axiom of choice or continuum hypothesis) or a brief biography (Bolzano, Brouwer, Jordan, Cantor). The topological part contains compact Hausdorff spaces, products, quotients, normal spaces and Urysohn extension theorem, connected spaces and Jordan theorem, and Tychonoff theorem. The point of view is closer to the geometrical one than to the functional one. Also the selection and explanation of material in the book is not quite standard, which is another reason to look at it. (mh)

M.Willem: Analyse harmonique r?elle, Hermann, Editeurs des Sciences et des Arts, Paris, 1995, 235 pp., 150.00 Ffrs, ISBN 2-705-66287-1

The book under review is an introduction to Fourier analysis at a level suitable for students having a basic background in real analysis. It consists of an Introduction with a brief historical survey, stressing the importance of trigonometric series for the development of analysis, ten chapters, the bibliography referring to basic monographs in the field, and a list of symbols and an index. In most of the chapters one can find historical remarks and exercises. Chapters 1–4 contain preparatory material. The exposition has been written in the Bourbaki spirit, that is, the measure comes after the introduction of the Lebesgue integral, the L^p spaces are defined as completions of the space of smooth functions in the appropriate norm, etc. Chapter 4 includes also an introduction to spectral theory. Chapters 5 and 6 are the core of the book, devoted to Fourier analysis: first Fourier series (the L^2 case, Hölder continuous functions, Bernstein's theorem, divergent series, Gauss' summation, Fresnel integrals, Weyl's ergodic theorem), then tempered distributions are introduced, and the Fourier transform is considered in L^2 and BL^2; in addition, Heisenberg's inequality and the Poisson summation formula are presented. After the reader becomes familiar with the concept of distributional derivatives, Sobolev spaces are introduced; the author presents standard density theorems, proves imbeddings into $C_0^k(R^n)$, and the Rellich–Kondrashov compactness theorem. In Chapter 8 the regularity theorem for elliptic operators and the existence theorem (based on Riesz' representation theorem) are proved and the author touches also on the spectral problem in this setting. Chapters 9 and 10 contain supplementary material, namely, weak type interpolation, the maximal theorem and the Sobolev imbedding theorem in the sublimiting case and in the form of convolution inequality for the Riesz kernel in Lebesgue spaces. The reader finds there also basic information about spectral problems for the p-Laplacian, and elements of duality theory for normed spaces (and especially for the Lebesgue spaces). The book contains classical material; the exposition is, however, self-contained, very well written and balanced. (mkr)

R.Meise, D.Vogt: Introduction to Functional Analysis, Oxford Graduate Texts in Mathematics, vol.2, Clarendon Press, Oxford, 1997, x+437 pp., GBP 47.50, ISBN 0-198-51485-9

This book is a translation of the first German edition (Einführung in die Funktionalanalysis, Vieweg 1992) and contains some corrections from the authors. It is divided into four parts. Part one contains some preliminaries from linear algebra and metric and topological spaces. The second part provides a classical introduction to functional analysis (Banach, Hilbert and Fréchet spaces, main principles of functional analysis, dual spaces, L^p-spaces, Fourier transform and Sobolev spaces). The third

part is devoted to the spectral theory of linear operators. This detailed excellent passage starts with Riesz-Schauder theory of compact operators. Then the authors introduce Banach algebras and derive the spectral theorem for normal operators on Hilbert spaces. Notions such as Hilbert-Schmidt and trace operators are also discussed. This part further contains Gelfand's theory for C^*-algebras, spectral theory of unbounded operators using the Caley transform and von Neumann's theory of self-adjoint extensions of symmetric operators. The last part is by no means elementary. It starts with the theory of locally convex spaces and their duality. Subsequent chapters are devoted to projective and inductive topologies, Fréchet and (DF)-spaces including recent results on the exactness of short sequences of Fréchet spaces. Advanced chapters on Köthe sequence spaces, nuclear and power series spaces containing the splitting theorem and a characterization of subspaces and quotients of the space s of rapidly decreasing sequences conclude the book. The appendix contains a brief introduction to integration theory on locally compact σ-compact topological spaces via Daniell's approach. The book can be warmly recommended to graduate students of mathematics and physics and also to everybody interested in functional analysis. (jl)

V.A.Kozlov, V.G.Mazya, J.Rossmann: Elliptic Boundary Value Problems in Domains with Point Singularities, Mathematical Surveys and Monographs, vol.52, American Mathematical Society, Providence, 1997, ix+414 pp., GBP 70.00, ISBN 0-821-80754-4

The goal of this book is a systematic and self-contained exposition of a theory of linear elliptic boundary value problems in domains with isolated singularities on the boundary. A boundary value problem consists of a differential equation (or a system of differential equations) $Lu = f$ for the unknown function (vector-function) u in a domain $\Omega \subset R^n$ and some boundary conditions $Bu+C\underline{u} = g$ on $\partial\Omega$, where additionally to the unknown functions in the domain Ω also an unknown vector-function $\underline{u}$ on the boundary $\partial\Omega$ appears. Here B is a vector (or a matrix) differential operator on Ω and C is a matrix differential operator on $\partial\Omega$. The book consists of three parts. In the first part the authors consider the boundary value problem in a domain with smooth boundary. They give a detailed proof for the equivalence of the ellipticity, the Fredholm property of the operator

$$A = \begin{pmatrix} L & 0 \\ B & C \end{pmatrix}$$

and the validity of a priori estimates for solutions in corresponding Sobolev spaces. In this assertion the operator A is considered in Sobolev spaces of both positive and negative order. The second part of the book is concerned with elliptic boundary value problems in cylinders, cones and bounded domains with conical points. The third part of the book concerns boundary value problems in domains with other singularities. In particular, boundary value problems in domains with a cusp are considered. Here the solvability of the boundary value problem in special weighted Sobolev spaces depending on the geometry of the domain near the point singularity is studied. (dm)

I.T.Adamson: A Set Theory Workbook, Birkhäuser, Boston, 1998, viii+154 pp., DM 68.00, ISBN 0-817-64028-2, ISBN 3-764-34028-2

This workbook is an unconventional approach to the basic course in set theory for an advanced undergraduate or beginning graduate course. According to the famous educational method of R.L. Moore this book encourages students to solve problems by themselves. The material presented in thie book can serve as the text for a one semester course or as a supplement to a larger course. The workbook covers (based on the Von Neumann-Bernays-Gödel axiomatic approach) the basic topics of the elements of the set theory. Part One presents basic definitions and exercises. They include all the material such as theorems, etc. The reader is motivated to solve the exercises alone. Part Two provides solutions to given examples in a very clear style, so anyone can check his own approach and improve his mathematical style. This valuable workbook is in a form similar to the authors previous text "A General Topology Workbook" and can be strongly recommended as a self-study tool useful to both students and teachers. (pp)

M.Yor: Some Aspects of Brownian Motion. Part II: Some Recent Martingale Problems, Lectures in Mathematics, Birkhäuser, Basel, 1997, xii+144 pp., DM 38.00, ISBN 0-817-65717-7, ISBN 3-764-35717-7

This is the second part of the lectures of the author given at ETH Zürich. Many new interesting results appear in these lectures. The subject is very important also outside the field of pure mathematics and theoretical probability theory, in particular in mathematical finance. The previous part (I) dealt with Brownian functionals, winding numbers, time spent by a Brownian particle in a subinterval, etc. Among the main themes of part II are: Brownian filtration and enlargements of filtrations, Burkholder-Gundy martingale inequalities, martingales vanishing on the zero set of Brownian motion, Azema-Emery martingales and chaos representation, filtration of truncated Brownian motion, Walsh's Brownian motion, principal values of diffusion local times, probabilistic interpretation of the Riemann zeta function in terms of Bessel processes, and also comments on new developments in the topics discussed in Part I. The book can be used either as an advanced text on Brownian motion or as a complement to existing texts. (mzah)

H.Triebel: Fractals and Spectra related to Fourier analysis and function spaces, Monographs in Mathematics, vol.91, Birkhäuser, Basel, 1997, viii+271 pp., DM 148.00, ISBN 3-764-35776-2, ISBN 3-817-65776-2

This book is devoted to a study of those aspects of fractal geometry in R_n which are connected to

Fourier analysis, function spaces, and pseudodifferential operators. In an earlier book [D.E. Edmunds and H. Triebel, "Function spaces, entropy numbers, differential operators", Cambridge, 1996] the authors successfully applied estimates of entropy numbers of compact embeddings between function spaces to the spectral theory of degenerate pseudodifferential operators on bounded domains and on R_n. A good part of the book under review is based on similar techniques, but this time in the context of fractals. One of the central aims of the book is to introduce and study function spaces on d-sets. Let Γ be a d-set.The $L_p(\Gamma)$ spaces are relatively easy to define since the measure on Γ is more or less uniquely determined, but their structure and relations to other function spaces are very complicated. This together with the introduction and study of the $B_{s_{p,q}}(\Gamma)$ spaces is treated in detail in Chapter 4, and needs a lot of deep preliminary material. This is contained in Chapters 2 and 3, and includes entropy numbers on weighted ℓ_p spaces with a dyadic block structure, and a new approach to the atomic decomposition of spaces $B_{s_{p,q}}$ and $F_{s_{p,q}}$ on R_n, consisting of further atomizing of the atoms, which results in subatomic (or quarkonial) decomposition. A thorough study of asymptotic behaviour of entropy numbers of embedding between these function spaces is carried out next. Needless to say, there is virtually no literature on this topic and hence most of the presented material is published here for the first time. The final Chapter (5) deals with spectra of pseudodifferential operators with fractal coefficients. On suitable function spaces, these operators are compact, and estimates for distribution of their eigenvalues and counting function can be obtained. Particular attention is paid to the n-dimensional drum with a compact fractal layer. (lp)

H.Völklein: Groups as Galois Groups. An Introduction, Cambridge Studies in Advanced Mathematics, vol.53, Cambridge University Press, Cambridge, 1996, xvii+248 pp., GBP 35.00, ISBN 0-521-56280-5
This book is about the Inverse Galois Problem - to construct a Galois extension of the rational field with prescribed Galois group. Since it is difficult to understand the correspondence between equations of degree n over the rationals and subgroups of the symmetric groups over n letters provided by the classical Galois theory, a less general problem was formulated: does every subgroup of the symmetric group S_n over n letters correspond to some algebraic equation of degree n? Hilbert proved the answer to be YES for the symmetric and alternating group over n letters. In the fifties Shafarevich extended Hilbert's result to all solvable subgroups of S_n. The book deals with recent results on the Inverse Galois Problem concerning simple and almost simple groups. The book assumes only a knowledge of elementary algebra and complex analysis and develops necessary background from topology, Riemann surface theory and number theory. (jtu)

L.Decreusefond, J.Gjerde, B.Øksendal, A.S. Üstünel (Eds.): Stochastic Analysis and Related Topics VI. Proceedings of the Sixth Oslo-Silivri Workshop, Geilo 1996, Progress in Probability, vol.42, Birkhäuser, Boston, 1998, 408 pp., DM 268.00, ISBN 0-817-64018-5, ISBN 3-764-34018-5
The book under review comprises twenty one papers contributed by the participants of the Sixth Oslo-Silivri Workshop on Stochastic Analysis, held in Geilo in 1996. The proceedings open with two long surveys based on invited lectures: "Stochastic differential systems with memory: Theory, examples and applications" by Salah-Eldin A. Mohammed, and "Backward stochastic differential equations and viscosity solutions of systems of semilinear parabolic and elliptic PDEs of second order" by Étienne Pardoux. Moreover, A.S.Üstünel's survey paper on stochastic analysis on Lie groups is included. The papers in the book address a wide range of topics in stochastic analysis nonetheless, the prominent rôle played by infinite dimensional problems and methods being notable. (jse)

B.D.Reddy: Introductory Functional Analysis. With Applications to Boundary Value Problems and Finite Elements, Texts in Applied Mathematics, vol.27, Springer-Verlag, New York, 1998, xiv+471 pp., 145 fig., DM 128.00, ISBN 0-387-98307-4
This book provides a reasonable introduction to functional analysis and treats its application to boundary value problems and finite elements in detail. It starts with twenty pages of prologue showing how boundary value problems arise as mathematical models of real situations. Basic notions of functional analysis are explained in the first part of the book. Here is a list of main topics: Lebesgue measure and integration in Euclidean spaces, Banach and Hilbert spaces, linear operators, Fourier series, distributions and Sobolev spaces. The second part is devoted to a detailed study of elliptic boundary value problems in both classical and variational forms. Physical examples mostly from mechanics are included. These chapters cover topics such as existence, uniqueness and regularity of solutions, minimization of functionals, or Galerkin approximations. The last part is a study of the finite element method. Each chapter ends with a collection of exercises (solutions are given at the end of the book) and bibliographical remarks. The book can be warmly recommended to graduate students and everybody who wishes to become acquainted with the basic elements of functional analysis and its applications in problems that arise in physics and engineering. (jl)

E.Godlewski, P.-A.Raviart: Numerical Approximation of Hyperbolic Systems of Conservation Laws, Applied Mathematical Sciences, vol.118, Springer-Verlag, New York, 1996, viii+509 pp., 75 fig., DM 88.00, ISBN 0-387-94529-6
Even though the topic of numerical approximation is contained in the very title of this book, it deals with muc else besides. As has already been remarked many times, in the context of hyperbolic conservation

laws, numerical analysis is highly connected to the theoretical analysis of the problem, or, in other words, the theoretical background needed for numerical analysis of hyperbolic conservation laws is almost as large as the theoretical knowledge itself. The book can be considered as an extension to the previous work of the two authors (Godlewski and Raviart: Hyperbolic Systems of Conservation Laws, Ellipses, Paris, 1991) where the emphasis was put on numerical analysis of scalar equations. Here, the aim is to treat the system case. The book is structured into an introduction and five chapters. The Introduction gives a review of basic "hyperbolic" notions. In the first chapter the authors deal with the Riemann problem for a system in one space dimension and in Chapter II a one-dimensional system of gas dynamics is studied in more detail. Chapters III-V represent the numerical part of the book. In Chapters III and IV the authors present an overview of numerical methods designed for the system case, starting with difference schemes, mentioning briefly kinetic schemes, and leading to finite volume schemes. The basic analysis of the schemes is given. Chapter V is devoted to an introduction to numerical boundary treatment. The book serves as both an introduction to the topic and an overview of known results. As the case of multidimensional hyperbolic systems is very complicated, no strikingly new results could be expected. The book is well written and will be valued both by graduate or postgraduate students and specialists in the field as a handy monograph. (mr)

R.F.Bass: Diffusions and Elliptic Operators, Probability and its Applications, Springer-Verlag, New York, 1998, xiii+232 pp., DM 118.00, ISBN 0-387-98315-5

R.F.Bass' book is a brief, concisely written introduction to results on second order linear elliptic and parabolic equations that may be obtained by probabilistic methods or by a mixture of probabilistic and analytic techniques. The book opens with more or less traditional topics, such as probabilistic representation of solutions (provided solutions exist) or one dimensional diffusions, and proceeds to subjects which have not been treated in a textbook form yet, such as the Harnack inequality of Krylov-Safonov for nondivergence form operators with L^∞-coefficients. The last chapter is an introduction to Malliavin calculus techniques for establishing existence of smooth densities. The reader is presupposed to have only a moderate knowledge of probability theory, chapters on stochastic differential equations and martingale problems being included in the book. (jse)

S.Kotz, N.L.Johnson (Eds.): Breakthroughs in Statistics. Volume III, Springer Series in Statistics, Springer-Verlag, New York, 1997, xxv+559 pp., DM 114.00, ISBN 0-387-94989-5, ISBN 0-387-94988-7

Norman L. Johnson and Samuel Kotz co-edited the internationally acclaimed, ten-volume *Encyclopedia of Statistical Science*, published by J.Wiley. The work on the Encyclopedia inspired them to prepare this book presenting a chronicle of the lives and achievements of men and women who had a great influence on the development of the science of statistics, spanning nearly four centuries. The book collects more than 110 of the most prominent names in theoretical and applied statistics and probability, with text partially written by 75 experts from around the world. It contains many authentic photographs and illustrations of prominent persons and includes a comprehensive overview of statistics from the seventeenth century to the present. I find the book extremely useful for students, who in their courses hear about theorems, laws, tests and other procedures named after one or more famous persons; for instance, they know the Neyman-Pearson lemma, Rao-Blackwell theorem, the Markov, Poisson and Wiener processes, the Wald sequential test and fundamental identity, the Wilcoxon, van der Waerden, Spearman and Kolmogorov-Smirnov tests, Hájek - Rényi inequality, among many others. The book enables them to learn under which circumstances and in which environments these results appeared. It is interesting to see that many personalities, considered as Americans, were Europeans by origin, who had to leave their countries under various circumstances. It is also interesting to see that people, who achieved excellent results in statistics, had a wide range of scientific interests and were originally educated as pure mathematicians, physicists and astronomers, economists, biologists and geneticists. This fact again illustrates that statistics as a science has deep roots in economy, astronomy, geodesy, engineering, medicine, social and biological science. Only four women are included among the personalities. Though only few, they undertook pioneering work in their periods; let us mention, e.g., Florence Nightingale, who was elected a fellow of the Royal Statistical Society in Victorian England in 1858 and an honorary member of the American Statistical Association in 1874. I find the book fascinating and recommend it to every statistician and probabilist. I conclude with the words of Karl Pearson, cited in the preface of the book: "It is impossible to understand a man's work unless you understand something of his environment." (jju)

M.H.Fenrick: Introduction to the Galois Correspondence. Second Edition, Birkhäuser, Boston, 1998, ix+235 pp., DM 118.00, ISBN 3-764-34026-6, ISBN 0-817-64026-6

This book is the second edition (first edition published in 1992) and is meant as a one semester course for students who have had a one semester course in elementary abstract algebra. The Galois correspondence is treated in its classical form as the fundamental correspondence between subgroups and intermediate fields; the author does not treat the topic in a more general setting. The second edition includes also some applications (e.g., constructibility, Wedderburn's Theorem on Finite Division Rings) and three appendices (on groups, factoring in integral domains and vector spaces). There are many exercises at the end of the sections and also in the text. The book is clearly arranged and well written and so it may be used either for independent study by students or

as a good reference text for teachers. The following remark might be useful for the next edition: The Hasse diagram on page 9 should be dual to the diagram on page 138. The assumption in proposition [2.5] (p. 233) should be weakened: The proof remains valid if V is only spanned by a set having n elements. (lbe)

A.Chagrov, M.Zakharyaschev: Modal Logic, Oxford Logic Guides, vol.35, Oxford University Press, Oxford, 1997, xv+605 pp., GBP 75.00, ISBN 0-198-53779-4
This book equips the reader with a comprehensive and many-sided point of view on modal logic. The logics in question are understood as extensions of the minimal system presented here by the propositional unimodal classical logic K, and similarly intuistic logics, treated also in the book, are extensions of Heyting's intuistic logic *Int*. The semantic based on Kripke frames presents a ground approach to these logics and it is combined with the universal algebraic methods and confronted with relevant syntactical notions. Modern algebraic semantics, duality theory, general completeness results and the results concerning algorithmic and complexity problems can also be found here. The explanation of the subject starts with basic notions and proceeds to the advanced themes, and should be understandable even to a reader without special prior knowledge of the subject; the chapters are supplemented by exercises and commentaries. The material is organized in five parts: Introduction, Kripke semantics, Adequate semantics, Properties of Logics, Algorithmic problems. The book can probably well satisfy the aim of the authors to be useful for both novices and specialists in modal logic. (jml)

K.Szymiczek: Bilinear Algebra: An Introduction to the Algebraic Theory of Quadratic Forms, Algebra, Logic and Applications Series, vol.7, Gordon and Breach Science Publishers, Amsterdam, 1997, xii+486 pp., GBP 55.00, ISBN 9-056-99076-4
This monograph deals with general theory of bilinear spaces, that is, finite dimensional K-linear spaces equipped with a bilinear functional from $V \times V$ to K, where K is an arbitrary field. Part I deals with bilinear spaces and their morphisms - isometries. The main results concern diagonalization, Witt's Prolongation and Cancellation Theorems, and isometry groups. Several classical results on orthogonal and symplectic groups are included. Part II concerns existence and uniqueness of Witt decomposition into direct orthogonal sums of anisotropic and metabolic subspaces. The Witt ring, $W(K)$, of K is introduced. Pfister forms are studied, primarily in order to provide a bijective correspondence between minimal prime ideals of $W(K)$ and orderings of K, and to prove Pfister's Local-Global Principle. A couple of other results are proved here, e.g., concerning formally real fields. Part III deals with invariants - Hasse and Witt invariants of quadratic forms - and with Brauer group of K. Among other results, Harrison's Criterion in characteristic $\neq 2$ is proved, stating that K and K' are equivalent with respect to quadratic forms iff $W(K) \cong W(K')$. Moreover, symbolic Hasse and Witt invariants are discussed in Appendix A. Each of the 25 chapters is followed by exercises. Also, Appendix B consists of selected problems with hints, intended to connect the presented material with original research papers. This book provides an easily accessible, but concise, introduction to the subject. Both students and professionals will find it a useful addition to the mathematical literature. (jtrl)

P.R.Cromwell: Polyhedra. "One of the most charming chapters of geometry", Cambridge University Press, Cambridge, 1997, xiii+451 pp., GBP 30.00, ISBN 0-521-55432-2
In ten chapters and two appendices, this book contains a thorough treatment of all that is known about polyhedra from the basic properties of polygons and solids through Platonic and Archimedean solids, polyhedra derived from these or other known solids by stellation or as compounds, up to more sophisticated problems of coloring and symmetry. The description of these topics, which emerge repeatedly in mathematical research, is in itself a remarkable feature of this book: all the topics are described in their historical, philosophical and practical contexts, as well as in the framework of current mathematical theories. A very interesting and detailed account is presented of the historical development of geometrical knowledge in distinct cultures and their contribution to this development is assessed. Many pages are dedicated to the impact of what was known in geometry (and in geometry of polyhedra in particular) on the overall philosophical view of the world (theories of Plato, Kepler and others). The interaction between the advances in geometry and its applications are described in Chapter 3 with great insight. Also the aesthetical aspects of polyhedra are pursued throughout. The book can be accessed easily by a reader with only a fragmented knowledge of secondary-school mathematics. A number of paragraphs are written to illuminate the basic mathematical notions and concepts (such as existence, proof etc.), as well as notions which the reader might have read or heard of under different circumstances (golden ratio, perspective or Möbius strip). the reader is also encouraged to make his own models of the solids under consideration. Valuable hints in this respect can be found at the end of the Introduction. (jtro)

T.M.Rassias (Ed.): Inner Product Spaces and Applications, Pitman Research Notes in Mathematics Series, vol.376, Addison Wesley Longman, Harlow, 1997, 269 pp., GBP 38.00, ISBN 0-582-32711-8
This book presents a series of papers dealing with the interaction between problems of analysis and geometry in the context of inner product spaces. Some of them are of an advanced level and some have a survey character. Most of them characterize inner product spaces as normed linear spaces. Let us briefly indicate the main topics: Birkhoff and isosceles orthogonality in normed linear spaces; quadratic norms; isometric

operators in Hilbert spaces and their stability; orthogonal systems; Müntz polynomials; Hilbert algebras; survey on spectral theory in Hilbert spaces and kernel functions; multivalued variational inequalities; the eigenvalues of the sum of two projections; cosine operator functions on inner product spaces; subgradients in normed spaces; functional equations of a real normed plane; and the Wigner equation. The book is accessible to everybody familiar with normed linear spaces. (jl)

Ch.C.Heyde: Quasi-Likelihood and Its Application. A General Approach to Optimal Parameter Estimation, Springer Series in Statistics, Springer-Verlag, New York, 1997, ix+235 pp., DM 88.00, ISBN 0-387-98225-6

The maximum likelihood approach introduced by Fisher ia a favourite statistical estimation procedure. Heyde's book presents and explains a generalization of that approach. The idea is simple. The derivative of the density logarithm used in the maximum likelihood is replaced by a general but fixed function. Looking for the most efficient estimator among quasi-likelihood estimators based on functions from a given set of functions, the variation of properly normalized functions is used as an efficiency criterion. That quantity is called information and is a natural generalization of the well-known Fisher information. The book begins with a brief introduction giving a motivation for the quasi-likelihood approach and proceeds with a general description of quasi-likelihood and asymptotic quasi-likelihood. Some other related techniques are mentioned in the book as well, e.g. E-sufficiency, projected quasi-likelihood, bypassing the likelihood, etc. The book covers hypothesis testing, asymptotic confidence zones and a study of consistency and asymptotic normality. (pl)

A.Pillay: Geometric Stability Theory, Oxford Logic Guides, vol.32, Oxford University Press, Oxford, 1996, x+361 pp., GBP 60.00, ISBN 0-198-53437-X

Geometric stability theory has grown out of categoricity theory and classification theory. Its origin is based on Zilber's idea that strongly minimal sets of uncountably categorical structures can be classified using associated pregeometries; this can lead to a classification of the structures in question. This idea, enriched by new important features, is further used for a classification of models outside of the uncountably categorical framework. The material is dense and fairly extensive knowledge of 'basic' model theory is assumed; also a substantial amount of work by the reader is required, including an ability to complete some notions and to prove or accept some propositions and facts. The book is nice, comprehensive, but rather difficult. (jml)

E.B.Andersen: The Statistical Analysis of Categorical Data. Third Edition, Springer-Verlag, Berlin, 1994, xi+532 pp., 41 fig., DM 185.00, ISBN 3-540-57696-7, ISBN 0-387-57696-7

The author deals with categorical data analysis, emphasizing the connection between statistical theory and application to real data. After a brief theoretical introduction to log-linear modelling based on the multinomial distribution and maximum likelihood principle, models in two-way, three-way and multi-dimensional contingency tables are treated systematically, including association graphs and model diagnostics. Incomplete tables and separability and collapsibility problems are studied as well. Logit models both with binary and polytomous explanatory variables and logistic regression models are explained. Interaction models like row-column association models are also considered and a quite substantial part of the textbook is devoted to correspondence analysis and latent structure models. Plenty of examples of real data sets from economics and social science, almost exclusively from Danish sources, are used to illustrate the theoretical explanations. (zp)

D.Bump: Automorphic Forms and Representations, Cambridge Studies in Advanced Mathematics, vol.55, Cambridge University Press, Cambridge, 1997, xiv+574 pp., GBP 65.00, ISBN 0-521-55098-X

This book is intermediate between an advanced textbook and a monograph. The motivation coming from the classical theory is included and a many-sided exposition reveals the underlying uniqueness principles. $GL(1)$ and $GL(2)$ cases are treated completely from both classical and adelic points of view. Although proved for $GL(2)$, theorems are stated in complete generality. The most important topics and techniques are covered. The first chapter includes the classical theory of Dirichlet L-functions, modular forms, Hecke characters, Hilbert modular forms and Maass forms. It gives examples of functorial lifting using the Rankin-Selberg method and inverse theorems and it also discusses Langlands conjectures. Further chapters use the power of representation theory. Admissible and unitary representations of $GL(2,R)$ are classified and the spectral decomposition of $L^2(\Gamma\backslash SL(2,R))$ is proved. After presenting Tate's thesis, the adelic theory for $GL(2)$ is constructed using the representation theory of groups over local fields developed in the book. The Langlands conjectures are discussed from a higher point of view. Students and researchers will find the book an understandable and penetrating treatment of a beautiful theory. (pš)

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