BULLETIN

INTERNATIONAL CENTER FOR MATHEMATICS

This issue of the CIM Bulletin is dedicated to Maria Manuel Clementino. She knows why.

COMING EVENTS

THEORETICAL AND COMPUTATIONAL FLUID DYNAMICS: THEMATIC TERM
CIM (Observatório Astronómico)
Coimbra, May - July 1999

ORGANIZING COMMITTEE:

Adélia Sequeira - Instituto Superior Técnico, Lisbon
Hugo Beirão da Veiga - University of Pisa (Italy)
Juha Videman - Instituto Superior Técnico, Lisbon

MAIN TOPICS:

- Mathematical modeling, analysis and numerical simulation of fluid flows including:

    - Compressible and incompressible viscous flows;
    - Viscoelastic and non-Newtonian fluid flows;
    - Free-surface flows;
    - Turbulent flows.

- Applications to industrial problems.

SCIENTIFIC OBJECTIVES:

The objective of the trimester is to promote research and to establish scientific contacts between foreign and portuguese specialists working in this area.

Some of the activities of the Thematic Term are further aimed to encourage young doctoral and post-doctoral students in developing investigation in this challenging field. The main events of the trimester will include:

- Organization of three Summer Schools (each consisting of 20 hours of lectures):

    - Industrial Mathematics, June 5-12.
      (Chairmen: A.M.Anile and A.Fasano.)
      1. Introduction to Hydrodynamical Models of Carrier Transport in Semiconductor Devices (A.M. Anile, Università di Catania, Italy);
      2. Mathematical Foundations of Electrical Network Analysis (P. Rentrop and M. Guenther, Technische Hochschule Darmstadt, Germany);
      3. Mathematical Modeling in Polymer Science (A. Fasano, Università di Firenze, Italy);
      4. Mathematical Modeling of Composite Materials Manufacturing Processes (L. Preziosi, Università di Firenze, Italy).

- Navier-Stokes Equations: Theory and Numerical Methods, June 28-July 3. (Chairman: H. Beirão da Veiga.)

  1. On the Blow Up of the Solution to Navier-Stokes Equations via Self-Similar Solutions (J. Necas, Northern Illinois University, USA and Charles University, Czech Republic);
  2. The Motion of a Rigid Body in a Viscous Liquid: Mathematical Theory and Applications (G.P. Galdi, University of Pittsburgh, USA);
  3. Vortex Methods: Design and Numerical Analysis (G.-H. Cottet, Université de Grenoble I, France);
  4. to be confirmed (D. Kröner, Universität Freiburg, Germany).

- Computational Fluid Dynamics, July 12-17. (Chairman: A. Quarteroni.)

  1. Domain Decomposition Methods in Fluid Dynamics (A. Quarteroni, Politecnico di Milano, Italy and EPFL, Lausanne, Switzerland);
  2. Multilevel Methods in Fluid Dynamics (C. Canuto, Politecnico di Torino, Italy);
  3. An Introduction to Numerical Methods for Fluid Dynamics and Upwind Schemes (B. Perthame, École Normale Supérieure, Paris, France);
  4. Spectral Methods for Incompressible and Compressible Flows (Y. Maday, Université Paris VI, France).

- Permanent research activities at CIM during the trimester, in particular organization of a weekly seminar and short courses. The following foreign researchers have already confirmed their participation:

  Serguei Nazarov (Institute of Mechanical Engineering Problems, St. Petersburg, Russia);

  Sarka Matusu-Necasova (Czech Academy of Sciences, Czech Republic);

  Konstantin Pileckas (Institute of Mathematics and Informatics, Vilnius, Lithuania);

  Milan Pokorny (Palacky University, Olomouc, Czech Republic);

  Antonin Novotny (Université de Toulon et du Var, France);

  Eduard Feireisl (Czech Academy of Sciences, Czech Republic);

  Anne Robertson (University of Pittsburgh, USA);

  Patrick Penel (Université de Toulon et du Var, France);

  Mark Steinhauer (Universität Bonn, Germany);

  Giovanni P. Galdi (University of Pittsburgh, USA);

  Jindrich Necas (Northern Illinois University, USA and Charles University, Czech Republic);

  Vsevolod Solonnikov (Steklov Institute of Mathematics, St. Petersburg, Russia).

- Offer 20 scholarships to post-graduate students to attend the Summer Schools and to participate in the weekly seminars at CIM.

SCHOOL ON SINGULARITIES IN ALGEBRAIC GEOMETRY AND STRING THEORY

Complexo Interdisciplinar da Universidade de Lisboa
Lisboa, July 8-17, 1999

ORGANIZING COMMITTEE:

Carlos Florentino - Lisbon, Instituto Superior Técnico
Margarida Mendes Lopes - Lisbon, Faculdade de Ciências
José Mourão - Lisbon, Instituto Superior Técnico
Orlando Neto - Lisbon, Faculdade de Ciências
João Pimentel Nunes - Lisbon, Instituto Superior Técnico.

The School on "SINGULARITIES IN ALGEBRAIC GEOMETRY AND STRING THEORY" is an activity of the International Center of Mathematics, and will be held in Complexo Interdisciplinar da Universidade de Lisboa, Av. Prof. Gama Pinto, 2, Portugal, July 8-17, 1999.

The aim is to have a 10 days long School on the fascinating interface between singularity theory (in complex algebraic geometry) and superstring theory. There will be 6 courses by leading experts on both mathematical

and physical aspects of singularity theory.

PLANNED COURSES:

- P. Aspinwall (Duke University):

  "Singularities and String Duality"

- V. Batyrev (University of Tuebingen):

  "Introduction to Toric Varieties and Mirror Symmetry"

- Ph. Candelas (University of Texas):

  "The Role of Singularities in String Theory"

- Le Dung-Trang (Université de Provence):

  "Introduction to Singularities"

- M.S.Narasimhan (International Center for Theoretical Physics):

  "Moduli Spaces of Vector and G-bundles over Riemann Surfaces"

- M. Reid (University of Warwick):

  "Resolution of Quocient Singularities and McKay Correspondence"

FINANCIAL SUPPORT:

For more details see the internet page of the school in:

http://www.fisica.ist.utl.pt/~jmourao/cim/main.html

WORKSHOP ON GEOMETRIC AND COMBINATORIAL METHODS IN THE HERMITIAN SUM SPECTRAL PROBLEM

(CMUC-CIM)
Coimbra, July 15-16, 1999

ORGANIZERS:

E. Marques de Sá, J. F. Queiró, A. P. Santana - Universidade de Coimbra

A problem in matrix theory which has interested mathematicians for many years is the following: Given two Hermitian matrices A and B, describe the spectrum of $A+B$ in terms of the spectra of A and B. Recently there were decisive developments in this problem, with contributions from algebraic geometry, representation theory, combinatorics and harmonic analysis. The workshop will gather experts from different fields who have worked on this problem, and will take place just before the Barcelona *ILAS* meeting.

The provisional list of speakers is as follows:

- Jane Day, San Jose State University, San Jose, California, USA, "An outline for proving Horn's conjecture following his approach"

- Shmuel Friedland, University of Illinois, Chicago, Illinois, USA, "Remarks on the eigenvalues of Hermitian matrices"

- Alexander Klyachko, Bilkent University, Ankara, Turkey, "Random walks on symmetric spaces and singular spectrum of matrix products"

- Allen Knutson, Brandeis University, Waltham, Massachusetts, USA, "The honeycomb model and its applications to the saturation conjecture"

- Norman Wildberger, University of New South Wales, Sydney, Australia, "Hypergroups and sums of Hermitian matrices"

- Andrei Zelevinsky, Northeastern University, Boston, Massachusetts, USA, "Tensor product multiplicities via generalized minors and tropical calculus"

For more details see the internet page:

http://www.mat.uc.pt/~cmuc/wrkshp2.html

SUMMER SCHOOL ON DIFFERENTIAL GEOMETRY

Coimbra, 3/7 September, 1999

ORGANIZERS:

Joana M. Nunes da Costa - Univ. de Coimbra
F. J. Craveiro de Carvalho - Univ. de Coimbra
Joana Teles Correia - Univ. de Coimbra
Raquel Caseiro - Univ. de Coimbra
A. M. d'Azevedo Breda - Universidade de Aveiro
Bernd Wegner - Technische Universität Berlin

STRUCTURE:

- 12 hour course on Geometry of Submanifolds by Dirk Ferus - Technische Universität Berlin

- 12 hour course on Poisson and Symplectic Geometry by I. Vaisman - Haifa

- Four 1 hour conferences, one per day, by

  - David R. J. Chillingworth - Southampton

  - Sheila Carter - Leeds

  - Jean Pierre Françoise - Paris

  - Bernd Wegner - Berlin

- Sessions where participants can talk on their own work.

Information available at

http://www.mat.uc.pt/diff_geo.html

PROGRAMME FOR 2000

At the meeting on 10th April 1999 the CIM Scientific Council gave their approval to the following events:

MACAU 2000
MATHEMATICS AND ITS ROLE IN CIVILIZATION

ORGANIZERS

Portugal

Graciano Neves de Oliveira, Department of Mathematics, University of Coimbra, president of the Portuguese Mathematical Society;

João Filipe Queiró, Department of Mathematics, University of Coimbra, representing the Centro Internacional de Matemática.

China

Yu Chong-hua, Department of Mathematics, Fudan University, Shanghai;

Zhang Wen-ling, National Natural Science Foundation of China, Beijing.

Macau

Iu Vai Pan, dean of the Faculty of Science and Technology, University of Macau;

Raymond Che-Man Cheng, Faculty of Science and Technology, University of Macau;

Zhou Chao Chen, Director of UNU/IIST, International Institute for Software Technology, United Nations University.

DATE

11th to 14th January 2000.

STRUCTURE

Aiming at a worldwide participation, the scope of the conference includes topics such as: