BULLETIN

INTERNACIONAL CENTER FOR MATHEMATICS

December 1998

5

Coming events

University teaching of Mathematics in Portugal and related issues

Debate

CIM, 6-7 February 1999

Organizers:

Luís Trabucho (Univ. Lisboa)
João Filipe Queiró (Univ. Coimbra)

The debate will take place in Caparide, near Lisbon.

Preliminary programme:

The teaching of mathematics for applications

Miguel Beleza, E. Arantes e Oliveira, A. St.Aubyn, J. Pedroso de Lima

The teaching of mathematics for Science and Engineering

J. Teixeira de Freitas, Luís Sanchez, C. Mota Soares, Joana Soares, L. Nunes Vicente

The teaching of mathematics for teacher training

Bártolo Paiva Campos, Armando Machado, E. Marques de Sá, A. Franco de Oliveira, A. Guedes de Oliveira

The use of technology in mathematics teaching at all levels

J. Carvalho e Silva, Vítor Neves, Yolanda Lima, Paulo Lourenço, Susana Nápoles

The organization of the mathematical community in Portugal

F. Dias Agudo, Graciano de Oliveira, J. A. Dias da Silva, Carlos Braumann, José F. Rodrigues

University organization in Portugal

L. Sousa Lobo, Irene Fonseca, Vital Moreira, António Vigário

Theoretical and Computational Fluid Dynamics: Thematic Term

CIM (Coimbra, Observatório Astronómico), May - July 1999

Organizing Committee:

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

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

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):

  "The Role of Singularities in String Theory"

- 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):

  "Introductory Course on Singularities and their Resolution "

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

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

- M. Reid (University of Warwick):

  "Lectures on 3-folds and Classification of Varieties"

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.

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Centro de Análise Matemática, Geometria e Sistemas Dinâmicos, Instituto Superior Técnico

Centro de Matemática e Aplicações Fundamentais da Universidade de Lisboa

Centro Interdisciplinar de Astrofísica, Instituto Superior Técnico

Projecto "Física Matematica"

Project TMR ERCFMRXCT980040 "Singularities of Differential Equations and Foliations".

For more details see internet page of the school in:
http://www.fisica.ist.utl.pt/~jmourao/cim/main.html

Geometric and combinatorial methods in the selfadjoint spectral sum problem

(CMUC-CIM)

Coimbra, July 1999

Organizers:

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

A fundamental open problem in pure mathematics is the following: Given two selfadjoint operators A and B on a Hilbert space, describe the spectrum of $A+B$ in terms of the spectra of A and B. The first nontrivial result on this question is found in a 1912 paper by H. Weyl on partial differential equations. A lot of progress has been made since then, mainly in the finite-dimensional case, that is, involving eigenvalues of Hermitian matrices. In the last few years, interest has intensified on this matter, with contributions from representation theory, harmonic analysis and algebraic geometry. The combinatorics of tableaux plays an essential role in all these approaches. The meeting will gather experts from different fields who have worked on this problem.

Summer School on Differential Geometry

Organizers

Joana M. Nunes da Costa - Univ. de Coimbra

F. J. Craveiro de Carvalho - Univ. de Coimbra

A. M. d'Azevedo Breda - Universidade de Aveiro

Bernd Wegner - Technische Universität Berlin

Date: 3/7 September 1999

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

Great Moments in XXth century Mathematics

In volume 20, number 2, of Mathematical Intelligencer our attention was drawn to an article by S. Smale where he mentioned, in Hilbert style, a number of mathematical problems that he thinks will be important in the future. Well, we decided to ask a number of mathematicians not for a similar list of problems but for their answer to the following question:

> If you had to mention one or two great moments in XXth century mathematics which one(s) would you pick up?

The choices of Professor José María Montesinos (Universidad Complutense de Madrid, Spain) are given below.

"For me the following are really remarkable moments:

The relationship of 3-manifold topology and the Theory of knots, as Dehn'surgery on links and branched covering spaces of Alexander.

Seifert discovery and classification of Seifert manifolds, central concept in 3-manifold topology and Knot Theory.

John Milnor's discovery of distinct differentiable structures for S^7, so starting differential topology.

J. H. C. Whitehead's discovery of a new open, contractible 3-manifold, so starting the train of ideas ending in the proof of the topological Poincaré conjecture in dimension 4.

Papakyriakopoulos's proof of Dehn's Lemma and other basic 3-dimensional geometric theorems, so starting modern 3-dimensional topology.

William Thurston's observation that the completion of certain incomplete hyperbolic structures in the complement of the figure 8 knot gives rise to Dehn surgery, leading him to conjecture that hyperbolic manifolds are in the center of 3-manifold topology.

It is likely that 20th Century mathematics will have as one of the most important developments, Knot Theory."