II. THEMATIC PROGRAMMES

The **Asymptotic Geometric Analysis 2002 Thematic Programme** organising committee: Vitali Milman (Tel Aviv), Nicole Tomczak-Jaegermann (U. Alberta) and Gideon Schechman (Weizmann Institute). Missing from photo Nassif Ghoussoub (PIMS and UBC) and Robert McCann (U. Toronto).

International Conference on Robust Statistics (ICORS 2002) participants during their excursion to Capilano. ICORS was part of the **2002 Thematic Programme on Selected Topics in Mathematical and Industrial Statistics**.

Changfeng Gui (UBC), Fang Hua Lin (Courant), Michael Struwe (ETH) and Wei-Ming Ni (Minnesota), the minicourse lecturers for the **Concentration Phenomena and Vortex Dynamics Workshop** which was part of the **2001 PIMS Thematic Programme in Nonlinear PDEs**.

Theme 2001 (A): Nonlinear Partial Differential Equations

Partial Differential Equations appear in the study of problems in material science, mathematical physics, fluid dynamics, Riemannian geometry, and many other related areas.

Differential Geometry has been a great source of problems and inspirational ideas for PDEs. Recent developments deal with harmonic maps, prescribed curvature problems, Monge-Ampère equations, Kahler-Einstein manifolds, Seiberg-Witten invariants and their connections to Gromov's invariants in Symplectic Geometry.

Concentration phenomena have been discovered in many different parts of science. Mathematically, they appear as vortices in Ginzburg-Landau equations, as spike-layers in biological diffusions, or as bubbles in geometrical problems occur.

Phase transitions often appear in material sciences problems such as the formation and evolution of grain boundaries in alloys, vortex states in superconducting materials, flame propogation, and related phenomena. The related equations include the Cahn-Hilliard equations, Allen-Cahn equations and again the Ginzburg-Landau equations.

The emphasized methods **(Variational and Viscosity solutions)** are very active areas of research, quite relevant to other areas of mathematics (Geometry, Topology, Analysis, Applied mathematics) with many applications in other disciplines (Physics, Chemistry, Biology, Economics and Engineering).

Programme Committee:

Jingyi Chen (UBC)
Michael Crandall (UC Santa Barbara)
Maria J. Esteban (U. Paris-Dauphine)
Nassif Ghoussoub (UBC)
Changfeng Gui (UBC)
Pierre-Louis Lions (U. Paris-Dauphine)
Wei-Ming Ni (U. Minnesota)
Paul Rabinowitz (U. Wisconsin)
Panagiotis Souganidis (U. Texas, Austin)

Programme

Viscosity Methods in PDEs,
PIMS-UBC, July 2–10, 2001

Phase Transitions,
PIMS-UBC, July 11–18, 2001

Concentration Phenomena and Vortex Dynamics,
PIMS-UBC, July 19–27, 2001

Variational Methods and their Applications,
PIMS-UBC, July 30–August 07, 2001

Geometric PDEs,
PIMS-UBC, August 8–17, 2001

More than 500 researchers from 15 countries participated in the PIMS Thematic Programme on Nonlinear PDE, which was held at PIMS-UBC from July 2 to August 18. The programme dealt with several interrelated topics originating in finance, physics, chemistry, biology and material sciences, as well as in geometry. The common feature of these topics is the interplay between nonlinear, geometric and dynamic components of partial differential equations. The focal point of each workshop was a series of minicourses given by some of the best world experts in the field.

There was an emphasis on: Viscosity methods in partial differential equations, Phase Transitions, Concentration Phenomena and Vortex Dynamics, Variational methods in partial differential equations as well as Geometric PDEs. There were also several related events happening at PIMS during the summer of 2001: a workshop on *Theoretical and Numerical Fluid Mechanics*, organized by Giovanni P. Galdi (Pittsburgh), John Heywood (UBC), Rolf Rannacher (Heidelberg) and the *Second Canada-China Mathematics Congress* which had an important component in Geometry and PDEs. It was a highly successful plan to capitalize on this large gathering of expertise in Western Canada so as to create a favourable atmosphere for graduate training and collaborative research.

The programme consisted of five consecutive workshops. The overlap between them was substantial enough and many participants were involved with several events. Each workshop had at least three minicourses of up to four hours each. These ran in the morning and targeted mainly graduate students, post-docs and all nonspecialists who were interested in learning new active directions of research. In addition, about 25 one-hour lecturers were selected and invited for each workshop by the programme committee.

Viscosity Methods in PDEs, PIMS-UBC, July 2–10, 2001

Organizers: P. L. Lions (Paris), M. Crandall (Santa Barbara), P. Souganidis (Maddison-Austin)

This workshop focused on the theory of viscosity solutions of differential equations and its applications. Viscosity solutions are the correct class of weak solutions of fully nonlinear first and second order, possibly degenerate partial differential equations. As such they provide the tools which are necessary for the analysis and further understanding of such equations. Some of the problems in this general context are:

- the theory of fully non-linear stochastic PDEs;
- boundary value problems with nonstandard boundary conditions for fully non linear elliptic PDEs;
- equations with singular coefficients and/or non standard growth conditions;
- various questions regarding the Stefan problems, which are related to the motion of moving interfaces with velocity depending upon the interface, positions, direction, curvature, gradient difference of the temperature, etc;
- the studies of ray theory for multiphase geometrical optics and of generalized characteristics which connect the theory of viscosity solutions to contact and symplectic geometry;
- regularity problems for nonlinear second order elliptic equations and free boundary problems.

There was also an emphasis on the applications of the theory to Phase transition, Combustion, Control theory, Mathematical Finance, and Image Processing.

Minicourse Lecturers:

Xavier Cabré (Universitat Politecnica de Catalunya) 2 lectures on *Non-Convex Fully Nonlinear Elliptic Equations: $C^{2,\alpha}$ Regularity for some Bellman-Isaacs Equations.*

Craig Evans (Berkeley): 2 lectures on *Hamilton-Jacobi Equations and Dynamical Systems.*

Robert Jensen (Loyola): 2 lectures on *Variational Problems in L^∞.*

Panagiotis Souganidis (Austin): 2 lectures on *Fully Nonlinear Stochastic PDEs.*

Andrzej Swiech (Georgia Tech): 5 lectures on *Viscosity Solutions in Infinite Dimensional Spaces and Optimal Control of PDEs.*

Thaleia Zariphopoulou (Austin): 2 lectures on *Viscosity Solutions in Finance.*

Main Speakers:

Maurizio Falcone (Università di Roma "La Sapienza"): *Semi-Lagrangian schemes for Hamilton Jacobi equations*

Pierpaolo Soravia (Università di Padova): *Uniqueness for degenerate elliptic equations with discontinuous coefficients*

Martino Bardi (Università di Padova): *Ergodicity, singular perturbations, and homogenization in the HJB equations of stochastic control*

Petri Juutinen (University of Jyväskylä): *The infinity eigenvalue problem*

Anne Bourlioux (University of Montreal): *Effective Hamiltonians for numerical turbulent combustion*

Espen Jakobsen (Norweigan University of Science and Technology): *Convergence rate for Approximation Schemes for Hamilton-Jacobi-Bellman equations*

Hitoshi Ishii (Tokyo Metropolitan University): *A model of the wearing process of a non-convex stone*

Fabiana Leoni (Universita Di Roma): *Diffusion generated motions in codimension* > 1

Elisabeth Rouy (Université de Tours): *Some applications of the theory of viscosity solutions to the problem of reflected stochastic differential equations*

Alexander Vladimirsky (UC Berkeley): *Ordered upwind methods for static PDEs*

Agnes Tourin (University of Toronto): *Approximation schemes for Hamilton-Jacobi equations*

Adam Oberman (University of Chicago): *Level set motion by growth, advection & mean curvature & reaction-diffusion advection equations*

I. Capuzzo Dolcetta (Università di Roma "La Sapienza"): *On Hopf - Lax formulas for Hamilton-Jacobi equations*

Mariko Arisawa (Tohoku University): *Long time averaged reflection force and homogenizations of oscillating Neumann type boundary conditions*

Shigeaki Koike (Saitama University): *On the limit of minimizers of variational problems*

Dejan Slepcev (University of Texas at Austin): *Approximation schemes for front propagation with nonlocal velocities*

Juan J. Manfredi (University of Pittsburgh): *The Subelliptic Maximum Principle*

Zhongdan Huan (Beijing Normal University): *On Removable Boundaries*

Michael Crandall (University of California, Santa Barbara): *Another way to say harmonic*

Phase Transitions, PIMS-UBC, July 11–18, 2001

Organizers: Nassif Ghoussoub (PIMS & UBC) and Changfeng Gui (UBC)

This workshop focused on problems in phase transition such as formation and evolution of grain boundaries in alloys, vortex states in superconducting materials, etc. The related equations include Cahn-Hilliard equations, Allen-Cahn equations, Ginzburg-Landau equations, and others.

Minicourse Lecturers:

Henri Berestycki (Université Paris VI): 4 lectures on *Propagation of fronts in excitable media*

David Kinderlehrer (Carnegie Mellon University): 4 lectures on *Topics in metastability and phase changes*

Main Speakers:

Yuxi Zheng (Indiana U., Bloomington): *The Semi-Classical Limit of Schrodinger-Poisson to Vlasov-Poisson Equations*

Hongming Yin (Washington State): *A free boundary problem arising in microwave heating processes*

Xavier Cabré (Universitat Politecnica de Catalunya): *A conjecture of De Giorgi on symmetry for elliptic equations in* R^n"

Reiner Schaetzle (ETH Zentrum): *Quadratic tilt-excess decay and strong maximum principle for varifolds*

Masayasu Mimura (Hiroshima University): *Annihilation and Reflection of Travelling Spots in Reaction-Diffusion*

Maurizio Falcone (Università di Roma "La Sapienza"): *Large Time-Step Schemes for Front Propagation*

Jacob Rubinstein (Technion): *Phase transitions in quantum wires*

Gieri Simonett (Vanderbilt University): *On the Stefan problem with surface tension*

Nicholas Alikakos (U. Tennessee Knoxville): *Motion By Surface Tension In Curved Ambient Space*

Peter Sternberg (Indiana U., Bloomington): *Existence and Non-existence Results for Permanent Currents in Superconductivity*

Daniel Phillips (Purdue University): *Thermal effects in superconductivity*

Pablo Padilla (Institute of Investigations in Mathematics, Applied and in Systems (IIMAS)): *Global geometric properties of solutions in a phase transition model*

Jian-Jun Xu (McGill): *Dynamics of Dendritic growth in solidification—global stability and limiting state selection*

Masaharu Taniguchi (Tokyo Institute of Technology): *Instability of planar traveling fronts in bistable reaction-diffusion systems*

Xiaofeng Ren (Utah State): *Energy Equilibria of the Copolymer Problem*

Francois Hamel (Université Paris VI): *Speed of propagation of fronts for rection-diffusion equations in periodic and general domains*

Yoshi Tonegawa (Hokkaido University): *Singular perturbation problem with a variable mean curvature field*

Changfeng Gui (UBC): *About the De Giorgi conjecture in dimensions 4 and 5*

Michelle Schatzman (U. Claude Bernard Lyon 1): *Asymmetric layers and solutions of elliptic systems in full space*

Junping Shi (College of William and Mary): *Saddle solutions of semilinear elliptic equations*

Alberto Farina (Université de Picardie Jules Verne): *Phase Transition and Symmetry*

Danielle Hilhorst (Université Paris-Sud): *Singular limit of a reaction-diffusion system with resource-consumer interaction*

Yuan-Wei Qi (Hong Kong University of Science and Technology): *Global self-similarity and Renormalization Group of a thermal-diffusive combustion system with critical nonlinearity*

Yasumasa Nishiura (Hokkaido): *Dynamics of interfaces for domain growth problems*

Xuefeng Wang (Tulane): *Metastability and Stability of Patterns for a Convolution Model for Phase Transitions*

Concentration Phenomena and Vortex Dynamics, PIMS-UBC, July 19–27, 2001

Organizers: Changfeng Gui (UBC) and Wei-Ming Ni (Minnesota)

Concentration phenomena have been discovered in many different areas. Mathematically they appear in the form of vortices in Ginzburg-Landau equations and of spike-layers in biological diffusions, etc. This workshop dealt with the up-to-date advances in these phenomena and the variational methods involved. Related equations include Ginzburg-Landau equations, nonlinear Schrodinger equations, Gierer-Meinhardt systems, and others.

Minicourse Lecturers:

Michael Struwe (ETH Zurich): 4 lectures on *Concentration problems in two dimensions*

Wei-Ming Ni (University of Minnesota): 2 lectures on*Diffusions, cross-diffusions, and their steady states*

Changfeng Gui (UBC), 2 lectures on *Diffusions, cross-diffusions, and their steady states*

Fang-Hua Lin (Courant Institute): 4 lectures on *Vortex Dynamics of Ginsburg-Landau and Related Equations.*

Main Speakers:

Robert Jerrard (U. Illinois, Urbana-Champaign): *Vortex filament dynamics for the Gross-Pitaevsky equation*

Yuan Lou (Ohio State): *A Semilinear Parabolic System for Migration and Selection in Population Genetics*

Yung-Sze Choi (University of Connecticut): *On the blowup of heat flow for conformal 3-harmonic maps*

Henry Warchall (National Science Foundation USA): *Spectrally stable encapsulated-vortex solutions of nonlinear Schrodinger equations (with Robert L. Pego Department of Mathematics University of Maryland)*

Norman Dancer (University of Sydney): *Peak solutions on annular regions and non-degeneracy conditions*

Amandine Aftalion (Université Paris VI): *Vortex energy and vortex bending in Bose Einstein condensates*

Dongho Chae (Seoul National University): *Nontopological Chern-Simons vortices-statics and evolutions*

Jun Cheng Wei (Chinese University of Hong Kong): *Multiple Clusters Generated By Reaction-Diffusion Systems*

Izumi Takagi (Tohoku University): *Remarks on the stability of single-spike patterns in annuli*

Hirokazu Ninomiya (Minnesota): *Reaction-diffusion approximation to cross diffusion systems*

Sylvia Serfaty (École Normale Supérieure de Cachan): *Vortices in the static Ginzburg-Landau equations of superconductivity*

Xingbin Pan (National University Singapore): *Concentration Phenomena of Ginzburg-Landau System and Surface Superconductivity*

Fang Hua Lin (Courant Institute): *Vortex dynamics of Ginsburg-Landau and related equations*

Changfeng Gui (UBC): *Diffusions, cross-diffusions, and their steady states*

Eiji Yanagida (Tohoku): *Stability analysis for reaction-diffusions systems with gradient/skew-gradient structure*

Matthias Winter (U. Stuttgart): *Concentrated solutions for the two-dimensional Gierer-Meinhardt system*

Patricio Felmer (U. de Chile): *Semi-classical limit for the one dimensional Nonlinear Schrodinger Equation*

Masaharu Taniguchi (Tokyo Institute of Technology): *Instability of planar traveling waves in bistable reaction-diffusion systems*

Joseph McKenna (Connecticut)

Jack Xin (U. Texas, Austin): *Focusing PDEs and their Applications in Optics and Speech Processing*

Stanley Alama (McMaster): *Vortices in the Lawrence-Doniach Model of Layered Superconductors in a Parallel Field*

Salome Martinez (Minnesota): *Cross-Diffusion for 3x3 competitive systems*

Shoji Yotsutani (Ryokoku University): *Limiting equations for a cross-diffusion system*

Patricia Bauman (Purdue University): *Results on a Ginzburg-Landau Model including Pinning of Vortices*

Vieri Benci (Università degli Studi di Pisa): *Concentration phenomena and solitary waves*

Michael Ward (UBC): *The Dynamics of Spikes for the Gierer-Meinhardt Model (joint work with David Iron (UBC grad student), Juncheng Wei (Chinese U. of Hong Kong))*

Zheng Chao Han (Rutgers University):

Dmitry Golovaty (University of Akron): *On uniqueness of vector-valued minimizers of the Ginzburg-Landau functional in annular domains*

Gabriella Tarantello (Università Roma II): *On Liouville type equations with singular data*

Variational Methods and their Applications in PDEs, Hamiltonian Systems and Mathematical Physics, PIMS-UBC, July 30–August 7, 2001

Organizers: Maria J. Esteban (Paris), Nassif Ghoussoub (UBC), Paul Rabinowitz (Wisconsin)

This session dealt with modern variational methods which have been at the core of mathematics for a long time, yet still experiencing major development: Various infinite dimensional extensions of Morse theory, new "gluing" techniques and useful duality methods. Variational methods have had enormous new applications in the study of problems in phase transition, Hamitonian systems, pattern formation, fluid dynamics, Riemannian geometry, etc., as they are used to answer questions about existence, multiplicity, location, asymptotics, concentration, etc.

Minicourse Lecturers:

Maria Esteban (U. Paris IX): 4 lectures on *Variational problems related to operators with gaps and applications in relativistic quantum mechanics*

Eric Séré (U. Paris IX): 4 lectures on *Variational problems in relativistic quantum mechanics: Dirac-Fock equations*

Yann Brenier (Paris): 4 lectures on *Variational problems related to fluid and plasma modelling.*

Main Speakers:

Vieri Benci (Università degli studi du Pisa): *Variational principles for Lorentz invariant field equations*

Jedrzej Sniatycki (U. Calgary): *Structure of a space of solutions for Yang-Mills equations and its quantization*

Robert McCann (U. Toronto): *Optimal Transportation - from Monge and Kantorovich to Beckmann and Beyond: Uniqueness and Transport Density*

Kazunaga Tanaka (Waseda University): *An elementary method for construction of complex solutions in 1-dimensional singular perturbation problems*

Zhi-Qiang Wang (Utah State University): *On weighted Sobolev inequalities and related PDEs*

Patricio Felmer (U. de Chile): *Peaks and Multipeaks for Nonlinear Schrodinger equation: A Variational Appproach*

Nassif Ghoussoub (PIMS): *On De Giorgi's conjecture in dimensions 4 and 5*

Ugo Bessi (Universita degli studi Roma III):

Gero Friesecke (Oxford): *2D Curvature functionals as Gamma-limits of 3D non-linear elasticity theory*

Yiming Long (Nankai University): *Closed characteristics on convex and star-shaped hypersurfaces in* R^{2n}

Bernhard Ruf (U. degli studi di Milano): *On a result by Carleson-Chang concerning the Trudinger-Moser inequality*

Pietro Majer (Università di Parma):

Sergey Bolotin (U. Wisconsin, Madison): *Variational methods for connecting orbits of Hamiltonian systems*

Claude Le Bris (CERMICS, École Nationale des ponts et chaussées), *On the ground state energy of systems composed of infinitely many particles*

Susanna Terracini (Politecnico di Milano), *Nehari's method and systems with large interaction*

Pietro Montecchiari (Università degli studi di Ancona), *Multiplicity of entire solutions for non autonomous Allen-Cahn type equations*

Vittorio Coti Zelati (Università di Napoli), *Chaotic behaviour for rapidly oscillating Hamiltonian systems*

Gabriella Tarantello (Universit‘a Roma II), *Elliptic problems in vortex theory*

Eric Paturel (Université Paris IX).

Louis Jeanjean (U. de Franche Comté), *An asymptotically linear problem on R^N autonomous at infinity*

Chao-Nien Chen (National Changhua U. of Education)

Boris Buffoni (École Polytechnique Fédérale de Lausanne), *Interfaces between homogeneous configurations for elastic cylinders of infinite length*

Patrick Bernard (École Normale Superieure)

Paul Rabinowitz (U. Wisconsin, Madison)

Geometric PDEs, PIMS-UBC, August 8–17, 2001

Organizers: Gang Tian (MIT) and Jingyi Chen (UBC)

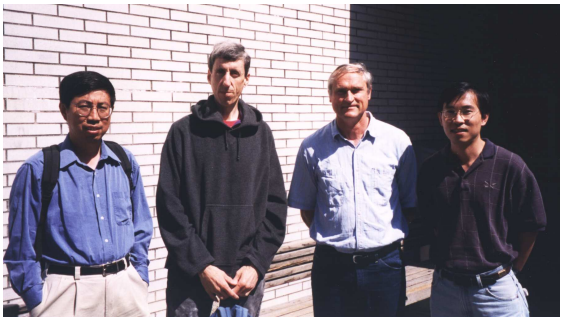
This workshop focused on PDE problems arising from geometry particularly in the study of Kahler-Einstein manifolds, minimal surfaces, scalar curvature, harmonic maps, and other phenomena.

Minicourse Lecturers:

Cliff Taubes (Harvard University), 4 lectures on *Pseudoholomorphic geometry as a tool to study smoothe 4-dimensional manifolds*

Richard Schoen (Stanford University), 4 lectures on *Geometric Variational Problems*

Gang Tian (Massachusetts Institute of Technology), 4 lectures on *Recent progress in complex geometry*



Gang Tian (MIT), Clifford Taubes (Harvard), Rick Schoen (Stanford) and Jingyi Chen (UBC).

Main Speakers:

George Daskalopoulos (Brown University), *The Yang-Mills flow in higher dimensions*

Pengfei Guan (McMaster University), *Hessian equations in classical and conformal geometry*

Nicholas Kapouleas (Brown University), *Singular perturbation constructions for minimal surfaces in the Sphere*

Jiaping Wang (University of Minnesota) *Counting harmonic functions and massive sets*

McKenzie Wang (McMaster University)

Daniel Pollack (University of Washington), *Gluing and wormholes for the Einstein constraint equations*

Jose Escobar (Cornell University), *New results on conformal deformation of metrics*

Robert Gulliver (Minnesota), *Embedded Minimal Surfaces and Total Curvature of Curves in a Manifold*

Jim Bryan (UBC), *Curves in Calabi-Yau 3-folds, Gromov-Witten invariants, and BPS states of M2-branes*

Jeff Cheeger (Courant Institute), *L_2-bounds on curvature and rectifiability of singular sets*

Jiayu Li (Chinese Academy of Sciences)

Ignasi Mundet i Riera (Universidad Autonoma de Madrid), *Hamiltonian Gromov-Witten invariants*

Peter Li (UC, Irvine), *Duality of local and global estimates for elliptic PDEs*

Yong Geun Oh (Korea Institute for Advanced Study, currently visiting University of Wisconsin–Madison), *Holomorphic volume preserving maps and special Lagrangian submanifolds*

Richard Wentworth (UC, Irvine)

Emmanuel Hebey (Université de Cergy-Pontoise), *Sharp Sobolev-Poincaré inequalities on Riemannian manifolds*

Bo Guan (University of Tennessee), *A Minkowski Problem for Convex Hypersurface*

Tom Ilmanen (ETH Zentrum), *Minimal surfaces and mean curvature flows with L^2 curvature bounds*

Bill Minicozzi (Johns Hopkins University), *Embedded Minimal Surfaces*

Jingyi Chen (UBC), *Quaternionic maps between hyperkahler manfolds.*

Theme 2001 (B): Theoretical, Numerical and Industrial Fluid Dynamics

The mathematical **theory of waves** has a wide spectrum of cross-disciplinary applications. In geophysical contexts waves are a primary method by which energy is transported in fluids and they are thus responsible for global circulation of the atmosphere, the oceans and the earth's mantle. In biological contexts, waves are used in the study of haemodynamic neural networks and respiratory flows. Waves are also studied for their use in remote sensing and have been exploited to map our atmosphere from space, to explore and see the deep oceans and to detect biological disease by non-invasive methods.

The equations that describe the most fundamental behaviour of a fluid were derived by Euler in 1755. They are the equations of conservation of momentum and conservation of mass of a fluid that is incompressible, has constant density and is inviscid. The initial boundary value problem for the **Euler equations** is surprising difficult and it is perhaps the most challenging of all problems in PDE that arises directly from physics. Incorporation of the effects of viscosity (for friction) leads to the **Navier-Stokes equations**. The fundamental open questions are all related to the issues of the formation of singularities in finite time.

Programme Organizers:

Giovanni P. Galdi (Pittsburgh)
John Heywood (UBC)
Rolf Rannacher (Heidelberg)
Bruce Sutherland (U. Alberta)
Andrew Bush (U. Alberta)
T. Bryant Moodie (U. Alberta)

Workshops:

3rd Annual PIMS Summer School in Industrial Fluid Dynamics,
U. Alberta, June 4–8, 2001

Wave Phenomena III: Waves in fluids from the microscopic to the planetary scale,
U. Alberta, June 11–15, 2001

Workshop on Theoretical and Numerical Fluid Mechanics,
Vancouver, August 20–25, 2001

Participants in the Summer School.

3rd PIMS Summer School in Industrial Fluid Dynamics, University of Alberta, May 27–June 8, 2001

Organizers: B. R. Sutherland and T. B. Moodie (U. Alberta)

This summer school offered an enriched learning environment in which the theoretical, experimental and computational aspects of fluid dynamics are synthesized. Participants attended a comprehensive series of lectures, and were given hands-on experience performing and analyzing experiments in the Environmental and Industrial Fluid Dynamics Laboratory. In addition, they ran numerical simulations using research-level codes. Topics included fluid dynamics fundamentals, industrial and environmental flows, geophysical fluid dynamics, turbulence modelling and computational fluid dynamics.

The summer school was particularly rewarding for the students since it was held in conjunction with the PIMS Thematic Programme.

Invited Speakers:

T. G. Shepherd (Toronto): *The Fluid Dynamics of the Middle Atmosphere*

H. J. S. Fernando (Arizona State): *Turbulence and Mixing in Stably Stratified Fluid Layers.*

Core Lecturers from University of Alberta

John C. Bowman: *Turbulence Modelling*;
Andrew B. G. Bush: *Climate Modelling*;
Peter Minev: *Computational Fluid Dynamics*;
T. Bryant Moodie: *Wave Theory*;
Bruce R. Sutherland: *Stratified Flows* and
Gordon E. Swaters: *Physical Oceanography*.

Wave Phenomena III: Waves in fluids from the microscopic to the planetary scale, University of Alberta, June 11–15, 2001

Organisers: T. B. Moodie, Andrew Bush, Bruce Sutherland and Gordon Swaters (U. Alberta)

The wave concept links together such diverse disciplines as geophysics, oceanography, meteorology, astrophysics, physiology, and biology. In geophysical contexts, waves are a primary method by which energy is transported in fluids and they are thus responsible for global circulation of the atmosphere, the oceans, and the earth's mantle. In biological contexts, waves are used in the study of haemodynamics, neural networks, and respiratory flows. Waves are also studied intensively for their use in remote sensing and have been exploited to map our atmosphere from space, to explore and see the deep oceans, and to detect disease by non-invasive methods. The enormous range of spatial scales spanned by waves is indicative of their relevance to many disciplines.

Colin Rogers (New South Wales) and T. Bryant Moodie (Alberta)

P. L. Sachdev

The previous two Wave Phenomena meetings were also successful and focused on wave propagation phenomena in a wide spectrum of applications. For the third Wave Phenomena Meeting, we chose to focus on the fluid medium for wave transmission. We did this first because of the general importance of the subject at this time with its relation to world climate change and our concerns with this change and second in order to better mesh with the topics of the 3^{rd} PIMS Summer School in Fluid Dynamics.

Waves III was attended by 145 delegates from Canada, Mexico, USA, Turkey, Ghana, France, Germany, The Netherlands, Scotland, Italy, India, Denmark, China, Japan, Sweden, New Zealand, Taiwan, Australia, and Russia. There were a total of 23 plenary talks that were given in the morning session each day. These were then followed by the contributed talks that were held in 5 parallel sessions during the afternoons.

The opening address was given by **Dick Peter** (Dean of Science, U. Alberta) who emphasized the important role that has been played in the mathematics community by PIMS and how meetings of this calibre wouldn't be possible without PIMS' support.

Plenary Speakers:

Peter G. Baines (CSIRO, Australia): *Dynamics of the Antarctic Circumpolar Wave*

Jerry L. Bona (U. Texas, Austin): *Nearshore Zone Dynamics and Beach Protection*

David Benney: *Some Evolution Equations for Selective Disturbances in Hydrodynamics*

Carlo Cercignani (Poli. di Milano): *On the Structure of Infinitely Strong Shock Waves*

H.J.S. Fernando (Arizona State): *Turbulence and Mixing in Stably Stratified Fluid Layers*

Roger Grimshaw (Monash): *Coupled Korteweg-de Vries Equations; Solitary Wave Interactions, Growth and Saturation*

Richard S. Lindzen (MIT): *What Limits Linear Growth?*

Michael S. Longuet-Higgins (UC, San Diego): *Dynamics of Standing Surface Waves: a Review*

Andrew J. Majda (Courant): *Convectively Coupled Tropical Waves*

Michael E. McIntyre (Cambridge): *The Pseudomomentum Rule Revisited: Wave-Mean Interaction*

James C. McWilliams, Lee Paul Graves, Michael T. Montgomery (UCLA): *A Formal Theory for Vortex Rossby Waves and Vortex Evolution: Natural Selection of Anticyclones at F*

Robert M. Miura, Jennifer Enns-Tuttan, Yuquing Wang (UBC): *Waves in the Brain*

A. Newell (Warwick): *Wave Turbulence and Intermittency*

W.R. Peltier (Toronto): *Breaking Waves and Mixing in Stratified Flows*

S. George Philander (Princeton): *How El Nino Changes when Climate Changes*

R.T. Pierrehumbert (Chicago): *Martian Baroclinic Amplitude Internal Solitary Waves in the Slope-shelf Area*

Peter B. Rhines (Washington): *Teaching Waves in the GFD Lab*

Colin Rogers (U. New South Wales): *Intrinsic Geometry in Soliton Theory: Hydodynamic and Magnetohydrostatic Connections*

P. L. Sachdev (Indian Inst. of Science, Bangalore): *Asymptotic Behavior of Some Nonlinear Partial Differential Equations*

Theodore G. Shepherd (Toronto): *Wave-vortex Interactions and Implications for Mixing in the Middle Atmosphere*

Melvin E. Stern (Florida State): *Internal Waves Amplified by Salt Fingers*

J.A. Whitehead (Woods Hole Oceanographic Inst.): *Upstream and Downstream Adjustment of Controlled Hydraulic Flows*

A complete list of speakers together with their abstracts, contact information, and pictures can be found at **http://waves3.math.ualberta.ca**.

Workshop on Theoretical and Numerical Fluid Mechanics Vancouver, August 20–25, 2001

Organizers: Giovanni P. Galdi (Pittsburgh), John Heywood (UBC, Chair), Rolf Rannacher (Heidelberg)

The meeting brought together leading researchers from several areas of fluid dynamics to share recent developments, discuss their significance, and bring into focus new directions and problems. The topics considered shared a unifying theme, in that their theoretical starting points are in the mathematical theory of the Navier-Stokes equations. Specifically, the focus was on: Nonlinear Fluids, Turbulence, Viscous Compressible Flow, Classical Navier-Stokes Problems, and Numerical Methods for these various types of problems.

Another focus was to bring to attention interesting problems for numerical computation. Presently, we have achieved the capability to compute two and three dimensional incompressible Navier-Stokes flow in complicated geometries, provided that the complexity of the solution (its range of scales) does not exceed the limitations of our hardware. The aim was to promote the extension of current numerical methods to problems for compressible and nonlinear fluids, and also to the modelling of turbulent flow. Also, with improved computational ability, many classical Navier-Stokes problems have become suggestive of interesting situations for numerical computation. Many of these raise interesting questions concerning artificial boundary conditions, for the restriction of idealized problems to bounded computational domains. Other problems for numerical computation involve questions of stability and bifurcation, and of attractors, and of the statistical properties of attractors, and of the energy dissipation in different regions of the spectrum.

Main Speakers:

Herbert Amann (Institute for Mathematics, Zrich): *Navier-Stokes equations in spaces of low regularity*

Joel Avrin (North Carolina, Charlotte): *A Large-Frequency One Point Attractor Theory for the incompressible Navier-Stokes Equation on Bounded Domains*

Markus Bause (U. Erlangen): *Approximation schemes for stationary compressible viscous flow*

Thomas J. Beale (Duke): *Computational Methods for Singular and Nearly Singular Integrals in Incompressible Fluid Flow*

Rodolfo Bermejo (U. Complutense de Madrid): *A numerical study of the attractor of 2D Navier-Stokes equations applied to Ocean dynamics*

John Bowman (U. Alberta): *A Statistical Description of Two and Three-Dimensional Turbulence*

Hi Jun Choe (KAIST): *On the regularity criterion of Navier-Stokes equations*

Reinhard Farwig (Inst. Tech. Darmstadt): *Maximal Regularity of the Stokes Operator in an Infinite Cylinder*

Robert Finn (Stanford): *Six remarkable properties of capillary surfaces*

Ian Frigaard (UBC): *Stability problems in parallel shear flows of visco-plastic fluids*

Hiroshi Fujita (Tokai U.): *Nonlinear Semi-group Theory and Nonstationary Stokes Flows under Boundary Conditions of Friction Type*

Giovanni P. Galdi (Pittsburgh): *Sedimentation of Symmetric Particles in Newtonian and Viscoelastic Liquids: A Mathematical Analysis with Applications*

Roland Glowinski (Houston): *On the motion of pendula in incompressible viscous fluids: A numerical approach*

Ronald Guenther (Oregon State): *Hydrodynamic Forces and Torques on Submerged Rigid Bodies - Steady Flow*

Claus Heine (Inst. Tech. Aachen): *A Numerical Method for Shape and Stability of the Rotating Drop*

David Hoff (Indiana): *Dynamics of Singularity Surfaces for Multidimensional, Compressible Navier-Stokes Flows*

Thomas J. R. Hughes (Stanford): *Large eddy simulation and the variational multiscale method*

Reinhard Illner (U. Victoria): *Diffusive equilibria in granular flow*

Nicholas Kevlahan (McMaster): *An adaptive wavelet method for fluid-structure interaction*

Dietmar Kroener (Freiburg): *Transparent boundary conditions for compressible flows*

Alex Mahalov (Arizona State): *3D Navier-Stokes and Euler Equations with Initial Data Characterized by Uniformly Large Vorticity*

Kyuya Masuda (Meiji, Japan): *Equations in Fluid Mechanics and analyticity*

Akitaka Matsumura (Osaka U.): *Inflow problems for a one-dimensional isentropic model system of compressible viscous gas*

Philip Morrison (U. Texas, Austin): *Transport by chaotic advection with nontwist Hamiltonian flows and symplectic maps of the plane*

Wayne Nagata (UBC): *Bifurcations on spheres and hemispheres: convection in planets and branching of plant tips*

Jindrich Necas (Charles U., Prague): *Global Analysis for fluids with pressure dependent viscosities*

Jiri Neustupa (Charles U., Prague): *Conditions for Local Regularity of a Weak Solution to the Navier-Stokes Equations*

Antonin Novotny (U. Toulon): *Navier-Stokes equations when the density is not square integrable*

Mariarosaria Padula (Ferrara): *Stability of an isolated fluid drop rotating with finite angular velocity*

Konstantin Pileckas (Vilnius U., Lithuania): *Asymptotics of Solutions to Navier-Stokes Equations in a Three- Dimensional Layer*

Olivier Pironneau (Montpellier II and Paris VI): *Optimal Shape Design with Turbulent flows*

Rolf Rannacher (Heidelberg): *Adaptive discretization in optimal control of flows*

Reimund Rautmann (Paderborn): *Navier-Stokes Approximations in Interpolation Spaces*

Niko Sauer (Pretoria): *A model for boundary permeation*

Okihiro Sawada (Hokkaido): *Global existence of two-dimensionl Navier-Stokes flow with nondecaying initial velocity*

Maria Schonbek (UC, Santa Cruz): *On zero mass solutions of viscous conservation laws*

Yoshihiro Shibata (Waseda U., Japan): *Stokes resolvent problem with Neumann type boundary condition*

David Siegel (Waterloo): *Equilibrium Configurations For A Floating Drop*

Ivan Straskraba (Math. Inst., Czech Academy of Sciences): *A brief summary of global properties of solutions to the compressible Navier-Stokes equations*

Chuong Tran (U. Alberta): *Constraints on the spectral distribution of energy and enstrophy dissipation in forced two-dimensional turbulence*

Stefan Turek (Dortmund): *On the next generation of CFD Tools*

Michael Wiegner (Inst. Tech. Aachen): *The Stokes Semigroup on an Infinite Layer*

Theme 2002 (A): Asymptotic Geometric Analysis

Asymptotic Geometric Analysis is concerned with the geometric and linear properties of finite-dimensional convex bodies, especially with the asymptotics of various quantitative parameters as the dimension of the underlying space tends to infinity. The techniques here combine geometric, analytic, probabilistic and combinatorial methods. The main directions of study are:

- *Convex Geometric Analysis* including problems from Classical Convexity and Isomorphic Geometry.
- *Asymptotic Combinatorics* including questions in Complexity Theory and Computational Geometry.
- Certain aspects of *Statistical Physics* that deal with "Threshold" and "Phase Transition" phenomena.

The main probabilistic tools used are deviation inequalities and the concept of concentration of measure phenomenon, which in fact is an isomorphic form of isoperimetric type inequalities. Measure Transport methods and related PDEs have provided new and powerful *Geometric Inequalities* of Brunn-Minkowski and Brascamp-Lieb type as well as novel approaches to Log-Sobolev and Talagrand-type inequalities. The subject is also connected with *quantized functional analysis* via important estimates for the distribution of eigenvalues and norms of random matrices, as well as with some aspects of free and quantum information theories, operator spaces and non-commutative L_p spaces.

Scientific Committee:

Vitali Milman (co-chair, Tel Aviv)

Nicole Tomczak-Jaegermann (co-chair, University of Alberta)

Nassif Ghoussoub (PIMS and UBC)

Robert McCann (University of Toronto)

Gideon Schechtman (Weizmann Institute)

Programme

Conference on Convexity and Asymptotic Theory of Normed Spaces,
PIMS-UBC, July 1–5, 2002

Concentration Period on Measure Transportation and Geometric Inequalities,
PIMS-UBC, July 8–12, 2002

Conference on Phenomena of Large Dimension,
PIMS-UBC, July 14–23, 2002

Focused Research Groups on Random Methods and High Dimensional Systems,
PIMS-UBC, July 24–August 5, 2002

Conference on Non-commutative Phenomena and Random Matrices,
PIMS-UBC, August 6–9, 2002

Conference on Banach Spaces,
PIMS-UBC, August 12–15, 2002

The goal of this thematic programme is to bring together some areas of Mathematics and Computer Science which are dealing with asymptotic behaviour of different parameters when the dimension, or a number of other relevant free parameters, increases to infinity .

Asymptotic geometric analysis is concerned with the geometric and linear properties of finite-dimensional convex bodies, especially with the asymptotics of various quantitative parameters as the dimension of the underlying space tends to infinity. This field is multidisciplinary in nature, typically combining geometric, analytic, probabilistic and combinatorial methods.

Fields medallist Jean Bourgain, IAS.

This Thematic Programme brought together over 220 senior experts, young researchers, postdocs and advanced Ph.D. students from mathematics and computer science. Represented among the programme of speakers were laureates of many different honours and prizes, such as the Fields Medal, Nevanlinna Prize, Wolf Prize, Salem Prize, Ostrowski Prize, and many others. The flavour of the Workshop may be felt from the following examples of speakers and directions (in broad categories and listed in every group alphabetically). Many more talks in every direction were, in fact, given.

One-hundred and ten of the lectures in the programme were taped and are available in both streaming realvideo and MP3 format. This provided an online resource to conference participants, by allowing them to review previous lectures throughout the programme. To provide a resource to the mathematics community at large, we have now made entire collection of taped lectures available from the main Thematic Programme web page given above and from the PIMS online lecture archive, **http://www.pims.math.ca/video**.

For the complete list of participants and lectures please see the Thematic Programme web page, **http://www.pims.math.ca/aga**.

The main directions of study were convex geometric analysis (asymptotic theory of convex bodies and normed spaces), some problems of discrete mathematics (one may call it asymptotic combinatorics) including problems of complexity theory, and some problems of statistical physics. A number of lectures were also given on closely connected subjects in probability and nonlinear PDEs arising in convex analysis and geometric inequalities.

The programme was strongly connected thematically with many of the lectures illustrating the crossover between these fields. Most of the participants took advantage of this by attending a number of the sessions in the programme.

AGA participants enjoying a reception at PIMS.

Additional support for this Thematic Programme was provided by the CRC grant of Nicole Tomczak-Jaegermann, by the NSF conference grants of Erwin Lutwak and Ted Odell, and by Microsoft.

Conference on Convexity and Asymptotic Theory of Normed Spaces PIMS-UBC, July 1–5, 2002

Organizers: Erwin Lutwak (Warsaw) and Alain Pajor (Marne-La-Vall´ee).

The programme opened with the Conference on Convexity and Asymptotic Theory of Normed Spaces. Lasting one week, from July 1–5, this conference featured lectures on classical convexity theory, Radon transforms and Fourier methods in convexity, asymptotic theory of high dimensional convex bodies, geometric functional inequalities, probabilistic methods in Convexity, and isoperimetric-type inequalities

The following lectures in the conference were taped and are available from the web site **http://www.pims.math.ca/video**:

Keith Ball (U. College London): *Convolution Inequalities in Convex Geometry*

Mohammad Ghomi (U. South Carolina): *A Survey of Some Recent Convexity Results and Problems in Classical Differential Geometry*

Peter Gruber (Technische U.): *Optimal Quantization*

Erwin Lutwak (Polytechnic U.): *L_p-curvature*

Vitali Milman (Tel Aviv): *Are Randomizing Properties of any Two Convex Bodies Similar?*

Gideon Schechtman (The Weizmann Institute): *Non Linear Type and Pisier's Inequality*

Rolf Schneider (U. Freiburg): *Mixture of Convex Bodies*

Concentration Period on Measure Transportation and Geometric Inequalities
PIMS-UBC, July 8–12, 2002

Organizer: Robert McCann (U. Toronto).

The second week of the Thematic Programme was devoted to the Concentration Period on Measure Transportation and Geometric Inequalities. The focus was on transportation of measure methods and their applications, including concentration of measure phenomenon, geometric functional inequalities (Brascamp-Lieb, Sobolev, entropy, Cramer-Crao and the like), and probabilistic methods. This concentration period was organized with a slightly lighter lecture schedule to allow ample time for extensive informal discussions between lectures.

The following lectures were taped:

Shiri Artstein (Tel Aviv): *Entropy increases at every step*

Keith Ball (U. College London): *Entropy growth for sums of IID random variables*

Franck Barthe (U. Marne-la-Valle): *Optimal Measure Transportation**

Gordon Blower (Lancaster): *Almost sure weak con- vergence and concentration for the circular ensembles of Dyson*

Christer Borell (Chalmers U.): *On risk aversion and optimal terminal wealth*

Yann Brenier (CNRS): *Density and current interpolation*

Jose A. Carrillo (U. de Granada): *Asymptotic behaviour of fast diffusion equations*

Jochen Denzler (U. Tennessee): *Fast Diffusion to self-similarity: complete spectrum, long-time asymptotics and numerology*

Michel Ledoux (U. Toulouse): *Measure Concentration, Transportation Cost, and Functional Inequalities*

Robert McCann (U. Toronto): *Nonlinear diffusion to self-similarity: spreading versus shape via gradient flow*

Vitali Milman (Tel Aviv): *Geometric inequalities of hyperbolic type*

Assaf Naor (Microsoft Corporation): *Entropy jumps in the presence of a spectral gap*

Roland Speicher (Queen's): *Free probability and free diffusion*

Van Vu (UC, San Diego): *Concentration of non-Lipschitz functions and combinatorial applications*

Qinglan Xia (Rice): *Optimal paths related to transport problems*

Conference on Phenomena of Large Dimensions
PIMS-UBC, July 14–23, 2002

Organizers: Vitali Milman (Tel Aviv), Michael Krivilevich, Laszlo Lovasz (Microsoft Research) and Leonid Pastur (U. Paris VII).

The main topics covered in the lectures were different phenomena observed in complexity theory, asymptotic combinatorics, asymptotic convexity, statistical physics and other theories of very high parametric families (or large dimensional spaces).

The following lectures were taped:

Noga Alon (Tel Aviv U.): *(n, d, λ)-graphs in Extremal Combinatorics*

Imre Barany (U. College London): *Sylvester's Question, Convex Bodies, Limit Shape*

Franck Barthe (U. de Marne la Vallee): *Transportation versus Rearrangement*

Alexander Barvinok (U. Michigan): *How to Compute a Norm?*

Noam Berger (UC, Berkeley): *Phase Transition for the Biased Random Walk on Percolation Clusters*

Christian Borgs (Microsoft Research): *Phase Transition in the Random Partitioning Problem*

Jean Bourgain (IAS): *New Results on Green's Functions and Spectra for Discrete Schroedinger Operators*

Yann Brenier (CNRS): *On Optimal Transportation Theory*

Mei-Chu Chang (UC, Riverside): *Recent Results in Combinatorial Number Theory*

Jennifer Chayes (Microsoft Research): *Graphical Models of the Internet and the Web*

Marianna Csornyei (U. College London): *Structure of null sets and related problems of geometric measure theory*

Apostolos Giannopoulos (Crete): *Random Sections and Random Rotations of High Dimensional Convex Bodies*

Efim Gluskin (Tel Aviv U.): *On the Sections of Product Spaces and Related Topics*

Jeong Han Kim (Microsoft Research): *The Poisson Cloning Model for Random Graphs with Applications to k-core Problems, Random 2-SAT, and Random Digraphs*

Gil Kalai (Hebrew U.): *Results and Problems around Borsuk's Conjecture*

Ravindran Kannan (Yale): *Random Submatrices of a Given Matrix*

Yoshiharu Kohyakawa (U. San Paulo): *The Regularity Lemma for Sparse Graphs*

Michael Krivelevich (Tel Aviv U.): *Algorithmic Applications of Graph Eigenvalues and Related Parameters*

Izabella Laba (UBC): *Tiling Problems and Spectral Sets*

Rafal Latala (Warsaw U.): *Some Estimates of Norms of Random Matrices (non iid case)*

Laszlo Lovasz (Microsoft Research): *Discrete Analytic Functions and Global Information from Local Observation*

Colin McDiarmid (Oxford U.): *Concentration and Random Permutations*

Vitali Milman (Tel Aviv U.): *Some phenomena of large dimension in Convex Geometric Analysis*

Assaf Naor (Microsoft): *Metric Ramsey-Type Phenomena*

Krzysztof Oleszkiewicz (Warsaw U.): *On a Nonsymmetric Version of the Khinchine-Kahane Inequality*

Leonid Pastur (U. Pierre & Marie Curie): *Some Large Dimension Problems of Mathematical Physics*

Bruce Reed (McGill U.): *Crayola and Dice: Graph Colouring via the Probabilistic Method*

Andrzej Rucinski (Adam Mickiewicz U.): *Ramsey Properties of Random Structures*

Mark Rudelson (U. Missouri): *Distances between Sections of Convex Bodies*

Shmuel Safra (Tel Aviv U.): *Probabilistically Checkable Proofs (PCP) and Hardness of Approximation*

Gideon Schechtman (The Weizmann Institute): l_p^n, $1 < p < 2$, *well embed in* l_1^{an}, *for any* $a > 1$

Miklos Simonovits (Hungarian Academy of Science): *Introduction to the Szemeredi Regularity Lemma*

Gordon Slade (UBC): *The Percolation Phase Transition on the n-cube*

Mikhail Sodin (Tel Aviv U.): *Zeroes of Random Analytic Functions*

Alexander Soshnikov (UC, Davis): *On the Largest Eigenvalue of a Random Subgraph of the Hypercube*

Benjamin Sudakov (Princeton U.): *On the Ramsey- and Turan-type Problems*

Stanislaw Szarek (U. Paris VI): *On Pseudorandom Matrices*

Nicole Tomczak-Jaegermann (U. Alberta): *Families of Random Sections of Convex Bodies*

Van Vu (UC, San Diego): *Divide and Conquer Martingales and Thin Waring Bases*

Avi Wigderson (IAS): *Expander Graphs - where Combinatorics and Algebra Compete and Cooperate*

Focused Research Groups on Random Methods and High Dimensional Systems PIMS-UBC, July 24–August 5, 2002

Organizers: Vitali Milman (Tel Aviv) and Nicole Tomczak-Jaegermann (U. Alberta).

Participants took advantage of this period to discuss previous lectures in the programme and to work in new directions. Furthermore, Gideon Schechtmann (Weizmann Institute) and Alexander Litvak (U. Alberta) each organized an informal series of lectures during this period.

The following lectures were taped:

Keith Ball (U. College London): *There are infinitely many irrational values of the zeta function at the odd integers*

Jean Bourgain (IAS): *New Results on Green's Functions and Spectra for Discrete Schroedinger Operators*

Yehoram Gordon (Haifa): *Applications of zonoids to Asymptotic Geometric Analysis*

Izabella Laba (UBC): *The Kakeya conjecture (Parts 1, 2)*

Rolf Schneider (Freiburg): *Stability of uniqueness results for convex bodies*

Rolf Schneider (Freiburg): *Minkowski's existence theorem and some applications*

Alexander Soshnikov (Davis): *Random Matrices: Gaussian Unitary Ensemble and Beyond (Parts 1–3)*

Conference on Non-commutative Phenomena and Random Matrices PIMS-UBC, August 6–9, 2002

Organizers: Gilles Pisier (U. Paris VI and Texas A & M) and Stanislaw Szarek (U. Paris VI and Case Western Reserve).

Topics addressed in this conference related to the distribution of eigenvalues of random matrices, norms of such matrices, some aspects of free and quantum information theories, quantized functional analysis and operator spaces, and non-commutative L_p spaces.

The following lectures were taped:

David Blecher (Houston): *Noncommutative M-structure and the interplay of algebra and norm for operator algebras*

Edward Effros (UCLA): *Operator spaces as "quantized" Banach spaces*

Alexander Gamburd (Stanford): *Random Matrices and Magic Squares*

Kenley Jung (Berkeley): *Free Entropy Dimension and Hyperfinite von Neumann algebras*

Marius Junge (Urbana): *The central limit procedure for noncommuting random variables and applications*

Franz Lehner (Graz): *A Good formula for noncommutative cumulants*

Christian Le Merdy (Besançon): *Holomorphic functional calculus and square functions on non-commutative L_p-spaces*

Alexandru Nica (Waterloo): *A2-point functions for multimatrix models, and non-crossing partitions in an annulus*

Eric Ricard (Paris 6): *Hilbertian Operator spaces with few completely bounded maps*

Haskell Rosenthal (Austin): *Can non-commutative L^p spaces be renormed to be stable?*

Zhong Jin Ruan (Urbana): *On Real Operator Spaces*

Mary Beth Ruskai (Lowell): *The Role of Maximal L_p Bounds in Quantum Information Theory*

Alexander Soshnikov (UC, Davis): *Determinantal Random Point Fields*

Roland Speicher (Queen's U., Kingston): *Maximization of free entropy*

Quanhua Xu (U. de Franche-Comté): *On the maximality of subdiagonal algebras*

Conference on Banach Spaces PIMS-UBC, August 12–15, 2002

Organizers: Bill Johnson (Texas A & M) and Ted Odell (U. Texas, Austin).

The programme closed with the Conference on Banach Spaces. Unfortunately, personal circumstances required Bill Johnson to cancel his participation at the last minute and his presence was greatly missed. This conference focused on the asymptotic theory of Banach spaces and other applications of local theory to the geometry of infinite dimensional Banach spaces.

The following lectures were taped:

George Androulakis (U. South Carolina): *The method of minimal vectors*

Yoav Benyamini (Technion): *An introduction to the uniform classification of Banach spaces*

Vassiliki Farmaki (Athens U.): *Baire-1 functions and spreading models*

Tadek Figiel (Polish Academy of Sciences): *Selecting unconditional basic sequences*

Mark Hoffman (U. Missouri): *The Banach envelope of Paley-Wiener type spaces E_p for $0 < p < 1$*

Alexander Koldobsky (U. Missouri-Columbia): *Fourier analytic tools in the study of sections and projections of convex bodies*

Tamara Kuchurenko (U. Missouri): *Weak topologies and properties that are fulfilled almost everywhere*

Joram Lindenstrauss (Hebrew U.): *On Frechet differentiability of Lipschitz functions, parts I and II*

Narcisse Randrianantoanina (Miami U.): *Weak type inequalities for non-commutative martingales*

Thomas Schlumprecht (Texas A & M U.): *How many operators do there exist on a Banach space?*

Lior Tzafriri (Hebrew U.): *Λ_p sets for some orthogonal systems*

Vaclav Zizler (U. Alberta): *Sigma shrinking Markushevich bases and Corson compacts*

Theme 2002 (B): Selected Topics in Mathematical and Industrial Statistics

Statistical models became, in the late 20th century extremely complex and high dimensional. One goal is to identify opportunities and challenges for model development and criticism and to begin to outline approaches to assessment of complex models. This requires bringing together leading practitioners and philosophers of scientific, Bayesian and frequentist modelling statistics with leading researchers in model assessment, validation and goodness-of-fit.

Robust Statistics and Statistical Computing deal with methods designed for processing large data sets of uneven quality, such as databases with outliers, gross errors or missing data. One focus is on the efficient computation of robust estimates using very large data sets.

Design and Analysis of Experiments are at the heart of the statistical sciences. Yet—unlike the designs originating from agricultural problems developed by Sir Ronald Fisher in the 1920's—many industrial problems are not well-explored in the statistical literature. To help North American industry compete globally, advanced statistical methods suitable for real applications need to be further developed.

Programme Organizers:

Charmaine Dean (SFU)

Peter Guttorp (U. Washington)

Chris Field (Dalhousie)

R. H. Zamar (UBC)

Randy Sitter (SFU)

Agnes Herzberg (Queen's)

Programme:

International Conference on Robust Statistics (ICORS 2002)
UBC, May 12–18, 2002

3rd MITACS Annual General Meeting: Statistics for Large Scale Industrial Modelling
UBC, Vancouver, May 23–25, 2002

Design and Analysis of Experiments
Vancouver, July 14–18, 2002

PIMS-MITACS Workshop on Filtering Theory and Applications
Edmonton and Jasper, July 25–30, 2002

International Conference on Robust Statistics (ICORS 2002), UBC, May 12–18, 2002

Conference Organisers: Luisa Fernholz (Temple Univ.), Ursula Gather (Dortmund), Chris Field (Dalhousie) and R. H. Zamar (UBC).

This conference was a forum for new developments and applications of robust statistics and statistical computing. Experienced researchers and practitioners, as well as younger researchers, came together to exchange knowledge and to build scientific contacts.

The conference touched upon many different aspects of data analysis in a fashion which integrates theoretical and applied statistics. One focus was the efficient computation of robust estimates using very large data sets.

The organisers of ICORS: Chris Field (Dalhousie), Luisa Fernholz (Temple) and Ruben Zamar (UBC). Missing from photo Ursula Gather (Dortmund).

Nearly 100 researchers from 10 different countries participated in ICORS 2002, which was hosted by PIMS and jointly sponsored by PIMS, MINERVA Research Foundation (USA) and SBF 475 at University of Dormunt (Germany).

ICORS 2002 was then followed up by a weekend Workshop on Computational Robustness hosted by PIMS and cosponsored by NSF.

The videos of the following lectures are available from **http://www.pims.math.ca/icors2002/**.

Claudia Becker (U. Dortmund): *Dimension Reduction and Nonparametric Regression: A Robust Combination*

Tadeusz Bednarski (U. Zielona Gora): *Robust Inference for the Cox Model*

Graciela Boente (U. Buenos Aires): *Robust Estimators in Partly Linear Models*

David Brillinger (UC, Berkeley): *John Tukey and "Troubled" Time Series Data*

Christophe Croux (U. Leuven): *On the Bianco-Yohai Estimator for High Breakdown Logistic Regression*

Laurie Davies (U. Essen): *Breakdown and Groups*

Peter Filzmoser (Vienna Tech): *Robust Factor Analysis*

Xuming He (U. Illinois at Urbana-Champaign): *Straight Talks about Robust Methods*

Karen Kafadar (U. Colorado): *Statistical Analysis of Microarray Data from Affymetrix Gene Chips*

Ricardo Maronna (U. Nacional de La Plata): *Approaches to Robust Multivariate Estimation Based on Projections*

Doug Martin (U. Washington and Insightful): *Robust Statistics in Portfolio Optimization*

Stephan Morgenthaler (École Polytechnique Fédérale de Lausanne): *The Multihalver*

Raymond Ng (UBC): *Robust Space Transformations for Distance-based Outliers*

David Rocke (UC, Davis): *Multivariate Outlier Detection and Cluster Identification*

Elvezio Ronchetti (U. Geneva): *Resistant Parametric and Nonparametric Modelling in Finance*

Peter Rousseeuw (U. Antwerp): *Robustness Against Separation and Outliers in Binary Regression*

Matias Salibian-Barrera (Carleton U.): *Estimating the p-values of Robust Tests for the Linear Model*

Arnold J. Stromberg (U. Kentucky): *Computational Issues in Robust Statistics*

David Tyler (Rutgers U.): *High Breakdown Point Multivariate M-Estimation*

Jane-Ling Wang (UC, Davis): *Semiparametric Random Effects Models for Longitudinal Data*

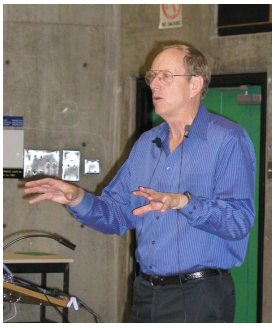
Doug Wiens (U. Alberta): *Robust, Sequential Design Strategies*

Victor Yohai (U. Buenos Aires): *High Breakdown Point Robust Regression with Censored Data*

Julie Zhou (U. Victoria): *Robustness Issues for Confidence Intervals*

3rd MITACS Annual General Meeting: Statistics for Large Scale Industrial Modelling, UBC, May 23–25, 2002

Conference Organisers: Arvind Gupta (MITACS), Nassif Ghoussoub (PIMS), Ken Davidson (Fields Institute) and Jacques Hurtubise (CRM).



Ron Graham (UC, San Diego)

The 3rd MITACS Annual General Meeting brought together over 350 students, researchers and industrial representatives from across Canada and the United States. The participants enjoyed a range of activities that included lectures, a poster and demo exhibition and competition, administrative meetings and social gatherings.

The AGM Exhibition commenced on Thursday morning, when students and post-docs began mounting over 70 posters and demos. Eight posters earned prizes, which consisted of plaques and cash awards. Three companies generously sponsored the first place prizes: Object Technology International, Inc.; StemCell Technologies Inc.; and Alcatel.

Gilbert Strang (MIT)

Anil Jain (Michigan State)

Indira Samarasekera (VP Research, UBC) gave the opening address of the welcoming reception at UBC's Museum of Anthropology. The conference banquet had in attendance Arthur Carty (President, NRC) and Philippe Tondeur (Director, Division of Mathematical Sciences, NSF). Both Carty and Tondeur gave talks that emphasized the importance of mathematical research to society at large.

The plenary speakers were:

Ron Graham (UC, San Diego): *Guessing Secrets*

Anil Jain (Michigan State): *Fingerprint Matching*

Gilbert Strang (MIT): *Filtering and Signal Processing*

Design and Analysis of Experiments, Coast Plaza Suites Hotel, Vancouver, July 14–18, 2002

Organizers: Randy Sitter (SFU), Derek Bingham (Michigan), Bruce Ankenman (Northwestern) and Agnes Herzberg (Queen's U.).

Many industrial problems are not well-explored in the statistical literature. To help North American industry compete globally, advanced statistical methods suitable for real applications need to be further developed. Statistical experimental designs, developed by Sir Ronald Fisher in the 1920's, largely originated from agricultural problems. Although the design of experiments for industrial and scientific problems may have the same basic concerns as design for agricultural problems, there are many differences: (i) industrial problems tend to require investigation of a much larger number of factors and usually involve a much smaller total number of runs (observations), (ii) industrial results are more reproducible, (iii) industrial experimenters are obliged to run their experimental points in sequence and are thus able to plan their followup experiments guided by previous results, unlike agriculture, in which all results are often harvested at one time, and (iii) models can be very complicated in industrial and scientific experimentation, sometimes requiring the need for nonlinear models or for computer modelling and finite element analysis.

The purpose of the PIMS Workshop on Design and Analysis of Experiments (DAE 1) was to begin a series of workshops to provide support and encouragement to junior researchers in the field of design and analysis of experiments, and to stimulate interest in topics of practical relevance to science and industry. In the summer of 2000, researchers from North America and abroad in the area of experimental design, including a large group of young talented new researchers, attended the First Midwest Conference for New Directions in Experimental Design in Columbus, Ohio organized by Angela Dean at Ohio State University, Kathryn Chaloner at the University of Minnesota, Dibyen Majumdar at the University of

Illinois Chicago and Dennis Lin at Penn State University. This workshop had a focus on applications of design in industry and was well received. It was sponsored by the National Science Foundation, the Ohio State University and Executive Jet Corp with a small award from Stat-Ease. A discussion group reached consensus that a series of similar workshops should be held every 2 or 3 years at different locations in North America. DAE 1 is the first workshop in this series in Canada. The bulk of its sponsorship came from PIMS with an additional contribution from Graduate Studies at SFU.

The next workshop in the series is being organized by Angela Dean, Kathryn Chaloner and Dibyen Majumdar and will be held in Chicago in 2003 (New Directions in Experimental Design, DAE2003, May 15-18, Chicago), with focus on medical applications. There was a roundtable discussion during the DAE 1 workshop in Vancouver to discuss general future structure and to determine interest among volunteers to host and organize the next in the series, following Chicago. This resulted in a commitment from researchers at Los Alamos National Laboratories to host DAE 3 in 2005 in Sante Fae, NM. Thus the PIMS support for this initial endeavour appears to have achieved its goal. An infrastructure and framework was established for a continuing such series at locations throughout North America to be held about every 2 years.

The DAE 1 workshop itself was a huge success. The invited speakers, the invited poster presenters and the attendees represented precisely the cross-section of young junior researchers and experienced world leaders in areas of both design and analysis of experiments that was hoped for. Visitors travelled from various sites in Canada and the US, as well as from Belgium, Sweden, Germany, the Netherlands, Italy, the United Kingdom, New Zealand and Taiwan; and represented both academia and industry. The talks and posters included such wide-ranging topics as Computer Intensive Methods for Design Selection, Design of Experiments in Bioinformatics, Drug Discovery and Marketing, Mathematical Theory of Design Construction and Bayesian Analysis of Designed Experiments, and represented leading research in these areas.

Invited Speakers:

Sabyasachi Basu (Boeing)
Scott Beattie (Eli Lilly)
Ching-Shui Cheng (UC Berkeley)
Shaowei Cheng (Academia Sinica, Taiwan)
Abdel El-Shawaari (National Water Research Institute)
Valeri Fedorov (Smith Kline)
Paul Green (Wharton School, Penn State)
Mike Hamada (Los Alamos National Labs)
Joel Huber (Wharton School, Penn State)
David Hunter (Penn State)
Stephen Jones (Boeing)
Abba Krieger (Wharton School, Penn State)
Warren Kuhfeld (SAS Institute)
Raymond Lam (GlaxoSmithKline)
Nhu Le (BC Cancer Agency)
Robert Mee (U. Tennessee-Knoxville)
Saumen Mandal (U. Manitoba)
Max Morris (Iowa State)
Bill Notz (Ohio State)
Greg Piepel (Pacifi c Northwest Labs-Battelle)
Giovanni Pistone (Politecnico di Torino)
Shane Reese (Brigham Young)
Louis-Paul Rivest (Laval U.)
Kirti Shah (U. Waterloo)
Bikas Sinha (U. Waterloo)
John Stufken (Iowa State)
Winson Taam (Boeing)
Boxin Tang (Memphis State)
Randy Tobias (SAS Institute)
Ben Torsney (University of Glasgow)
Joe Voelkel (Rochester Institute of Technology)
Marcia Wang (U. Waterloo)
C.F. Jeff Wu (U. Michigan)
Huaiqing Wu (Iowa State)
Don Ylvisaker (UCLA)
Kenny Ye (SUNY-Stony Brook)
Hongquan Xu (UCLA)
Hongtu Zhu (U. Victoria)
Lei Zhu (GlaxoSmithKline)
Jim Zidek (UBC)

PIMS-MITACS Workshop on Filtering Theory and Applications Edmonton and Jasper, July 25–30, 2002

Organisers: Robert Elliott (U. Calgary), Michael Kouritzin (U. Alberta), Tom Kurtz (U. Wisconsin-Madison) and Hongwei Long (U. Alberta).

Gopi Kallianpur (U. North Carolina)

Filtering theory is an active and current research field attracting many probabilists. In particular, there is increasing interest in applying filtering theory to real-world problems in areas such as mathematical finance, target detection and tracking, communication networks, pollution tracking, weather prediction, traffic management, and search and rescue. The main goal of the Conference was to bring current problems and theory together, benefiting all researchers, especially those new to filtering theory.

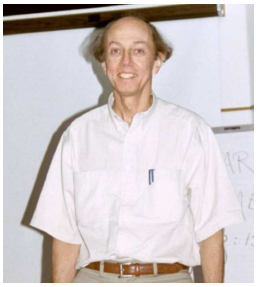
The four keynote speakers were:

Nick Duffield (AT&T): talk series entitled *Revealing the detail in network measurements*

Tyrone Duncan (University of Kansas): talk series entitled *Fractional Brownian motion and applications*

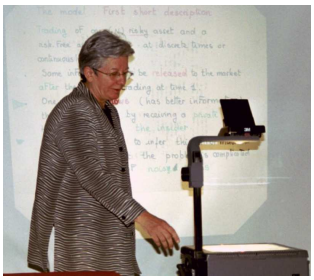
Gopi Kallianpur (U. North Carolina): talk series entitled *Lectures on nonlinear filtering theory*

Nicole El Karoui (Ecole Polytechnique): talk series entitled *Pricing and hedging financial products with partial information*



Tyrone Duncan (U. Kansas)

They are outstanding experts in their fields. Their lectures focused on the most recent development of filtering theory and applications to communication network and mathematical finance. There were many established researchers from five continents, who presented their recent and most exciting research accomplishment in the conference and exchanged their ideas with other participants. The conference attracted students and postdoctoral researchers from universities across North America, which will encourage future research activity in Canada. The conference benefited from industrial participants including AT&T, Lockheed Martin and Raytheon, who showed great interests in the conference and indicated desire to have more interaction and collaboration with scientists from academic institutions. We believe that the conference helped to advance the scientific development of filtering theory and its applications as well as offer benefits to industry.



Nicole El Karoui (Ecole Polytechnique)

The meeting was held at the University of Alberta from July 25–27 and was concluded in Jasper, Alberta from July 28–30.

The conference was cosponsored with the University of Alberta and the Applied Mathematics Institute of the University of Alberta.

The Invited Speakers included:

D. Blount (Arizona State)
A. Budhiraja (U. North Carolina)
H. Chan (U. Alberta)
P. Del Moral (Toulouse)
R. Elliott (U. Alberta)
W. Engler (Vision Smart)
D. Kenway (Vision Smart)
V. Krishnamurthy (U. Melbourne)
H. Long (U. Alberta)
M. Kouritzin (U. Alberta)
M. Prefontaine (U. Alberta)
B. Remillard (HEC, Montreal)
W. Sun (U. Alberta)
A. Tsoi (U. Missouri, Columbia)
F. Viens (Purdue)
P. Wiebe (U. Alberta)
Xun Yu Zhou (Chinese U. Hong Kong)

Theme 2003 (A): Inverse Problems and Applications

Inverse problems are problems in which the goal is to find objects their material or biological properties or information about their surrounding environment which cannot be measured directly or it is not desirable to do so. These problems arise in many areas of applications including geophysics, medical imaging, remote sensing and nondestructive evaluation of materials.

During the last twenty years or so there has been remarkable developments in the mathematical theory of inverse problems. These developments together with the enormous increase in computing power and new powerful numerical methods has made possible to make significant progress on increasingly more realistic and difficult inverse problems. The purpose of the period of concentration is to bring together mathematicians and practitioners to work on these problems on these problem. During 2003 a series of workshops on inverse problems will be held at different locations emphasizing the wide range of applications. Gunther Uhlmann is the coordinator of the PIMS thematic year.

Scientific Committee:

Gunther Uhlmann (Chair, U. Washington)
Richard Froese (UBC)
Nassif Ghoussoub (PIMS)
Michael Lamoureux (U. Calgary)
Gary Margrave (U. Calgary)
Jim Morrow (U. Washington)

Programme

Pan-American Advanced Studies Institute (PASI) on Partial Differential Equations, Inverse Problems and Nonlinear Analysis,
Centro de Modelamiento Matem´atico (CMM), Universidad de Chile, January 6–19, 2003

BIRS workshop on Scattering and Inverse Scattering,
Banff Conference Centre, Banff, March 22–27, 2003

Summer School in Seismic Wave Simulation and Seismic Imaging
U. Calgary, July 14–18, 2003

PIMS-MITACS Workshop on Inverse Problems in Geophysics,
PIMS at the U. Calgary, July 21–26, 2003

Workshop on Inverse Problems and Medical Imaging,
UBC, August 4–8, 2003

Optimal Transportation and Nonlinear Dynamics
UBC, August 11–15, 2003

Pan-American Advanced Studies Institute (PASI) on PDEs, Inverse Problems and Nonlinear Analysis, Centro de Modelamiento Matemático, Universidad de Chile, January 6–19, 2003

Organisers: Rafael Benguria (Pontificia U. Cat´olica de Chile), Carlos Conca (U. de Chile), Nassif Ghoussoub (PIMS & UBC), Raul Man´asevich (co-chair, U. de Chile), Wei-Ming Ni (U. Minnesota), Gunther Uhlmann (co-chair, U. Washington) and Michael Vogelius (Rutgers U.).

The PASI will consist of a series of intensive minicourses during the first week followed the second week by a workshop focused on latest developments. The minicourses will be given by L. Caffarelli, G. Ponce, F. Santosa, T. Toro and G. Uhlmann.

The PASI is sponsored by the US NSF, US Dept. of Energy, PIMS, Conicyt and the CMM. PIMS will be sponsoring the participation of Canadian students in PASI. Nomination letters for interested and qualified graduate students in Canadian universities should be sent by their supervisors to the PIMS Central Office at UBC. The deadline is October 15, 2002.

One of the main objectives of the PASI on PDE, IP and NA is to bring many of the recent developments to advanced graduate students, post-docs and other scientists in the Americas interested in these fields and their applications. Another important objective is to foster international cooperation throughout the Americas.

BIRS Workshop on Scattering and Inverse Scattering, Banff, March 22–27, 2003

Organisers: Richard Froese (Chair, UBC), Gunther Uhlmann (U. Washington).

The workshop will focus on recent developments in scattering and inverse scattering theory. In both these fields techniques of micro-local analysis, including the use of eikonal equations and of complex geometrical optics solutions to Schroedinger and other equations, has led to substantial progress in recent years.

Scattering theory seeks an understanding of spectral phenomena for noncompact manifolds. There has been a recent focus in this subject on what is now termed geometric scattering, which amounts to the study of scattering on classes of noncompact complete manifolds with regular structures at infinity. Some of the questions asked here concern the smooth parametrization of the continuous spectrum by functions on some ideal boundary, the structure of the scattering matrix as an operator on this ideal boundary, and the study of resonances, which are poles of the meromorphic continuation of the resolvent. There are many subtle connections between these objects and the geometry of the underlying manifold.

Summer School in Seismic Wave Simulation and Seismic Imaging, U. Calgary, July 14–18, 2003

Organisers: Gary Margrave (U. Calgary) and Len Bos (U. Calgary).

The first part of this school will examine real seismic data and present several mathematical models for the forward problem: the simulation of seismic waves. Essential mathematical techniques such as Green's functions, Kirchhoff diffraction theory, and ray theory will be developed and examined. In the second part, these concepts and tools will be applied to develop the prototypical approaches to the seismic imaging problem. The Born and Kirchhoff approximations will be shown to lead to direct schemes for the estimation of subsurface reflectivity that are the basis for modern imaging techniques. The strengths and weaknesses of these techniques will be examined and a survey of more advanced, emerging methods will be presented. Emphasis will be placed upon understanding the assumptions and limitations of each technique. The successful student will obtain both an understanding of the basis and mechanics of the major imaging techniques and will appreciate the outstanding problems at the forefront of research.

This course is for the mathematically skilled physical scientist who is enrolled in a degree programme at a PIMS University. Students will be assumed to have previous exposure to elementary mathematical analysis (calculus, linear algebra, ordinary and partial differential equations, and Fourier analysis) as well as experience with basic physical theory.

PIMS-MITACS Workshop on Inverse Problems in Geophysics, PIMS, U. Calgary, July 21–26, 2003

Organisers: Maarted de Hoop (Colorado School of Mines), Gary Margrave (Chair, Calgary), Gunther Uhlmann (Washington) and William Symes (Rice).

Seismic imaging creates images of the Earth's upper crust using seismic waves generated by artificial sources and recorded into extensive arrays of sensors (geophones or hydrophones). The technology is based on a complex and rapidly evolving, mathematical theory that employs advanced solutions to a wave equation as tools to solve approximately the general seismic inverse problem. In the year 2000, nearly $4 billion was spent worldwide on seismic imaging. The heterogeneity and anisotropy of the Earth's upper crust require advanced mathematics to generate wave-equation solutions suitable for seismic imaging. The workshop will bring together mathematicians familiar with these techniques and geophysicists familiar with the practical applications.

Workshop on Inverse Problems and Medical Imaging, UBC, August 4–8, 2003

Organisers: John Schotland (Chair), Richard Albanese (Armstrong Research Lab, Brooks AFB), Tom Budinger (Biomedical Engineering, Berkeley), David Isaacson (Courant), Amir Gandjbakhche (National Institute of Health) and Gunther Uhlmann (U. Washington).

This workshop will concentrate on recent developments in medical imaging including the advances in engineering and image processing mathematics which have allowed for significant enhancement of widely used imaging techniques like X-ray tomography, magnetic resonance imaging, single photon emission tomography, positron emission tomography and ultrasound. Of particular interest is recent progress in "elasticity imaging" which uses advances in the mathematical study of wave propagation in heterogeneous media for the evaluation of mechanical properties of tissue inaccessible to touch by a physician.

Optimal Transportation and Nonlinear Dynamics, UBC, August 11–15, 2003

Organisers: L. Caffarelli (U. Texas, Austin), M. J. P. Cullen (European Centre for Medium Range Weather Forecasts), L. C. Evans (UC, Berkeley), M. Feldman (U. Wisconsin, Madison) and W. Gangbo (Georgia Tech).

The theme around which this conference revolves is a transportation problem having its roots in economics, statistics, and geometry. Given two probability measures on a curved landscape, the problem is to determine the most efficient way to rearrange the mass of the first distribution to yield the second. Efficiency is measured against a function $c(x, y) \geq 0$ which specifies the cost per unit mass for transporting material from x to y on the curved landscape. After half a century of mathematical neglect, the past decade witnessed a revival of interest in optimal transportation, and watched as it blossomed into a fertile field of investigation as well as a vibrant tool for exploring diverse applications within and beyond mathematics. The transformation occurred partly because longstanding issues could finally be resolved, but also because unexpected connections were discovered which linked these questions to problems in physics, geometry, computer vision, partial differential equations, earth science and economics. Incarnations of this problem embed in current models for surprisingly diverse phenomena.

The research theme proposed for this meeting focuses on applications to models for atmospheric pressure fronts, the kinetic theory of gases, and geometric measure theory. This meeting is a natural follow up of the one, previously organized by the same research group, at the Fields Institute in Toronto, from August 20–25, 2001. That meeting gave an opportunity to experts of the Monge-Kantorovich theory to exchange knowledge, informations, and introduce other people from various background to the field. This second meeting is intended to help update the community on advances in this rapidly developing field, while at the same time focusing attention on key subjects which could not be covered in detail at the August 2001 meeting.

The aim is to bring together mathematicians working on transportation problems with a cross-section of scientists working in application areas.

Among our goals are to present and discuss new mathematical results and to introduce new problems in application areas that are ready for rigorous mathematical treatment. By inviting representatives from several application areas, it is expected that there will be cross-fertilisation of ideas between different applications, a fact that looks apparent from the August 2001 workshop. It is hoped to highlight some mathematical and application areas which did not receive much emphasis in the first workshop, thus reaching a somewhat different audience. It is also hoped to emphasize the training element, both by providing minicourses to introduce scientists to new areas of mathematics and new techniques, and by holding special contributed paper and tutorial sessions aimed at beginning researchers.