

Submittee: Reinhard Illner
Date Submitted: 2009-09-24 12:26
Title: Topics in kinetic theory
Event Type: Summer-School

Location:
University of Victoria

Dates:
29.06.2009-3.07.2009

Topic:
Kinetic Theory, Kinetic and Related Models

Methodology:
Summer school lectures (total of nine hours) by three main lecturers (Degond, Guo, Klar). Invited talks (30-50 min) by 19 other invited speakers. There were 15 other participants (graduate students and post-docs). Almost all the lecturers used our computer projection systems, but there were also a few blackboard talks.

Objectives Achieved:
The event succeeded both in introducing and tutoring many young colleagues (both students and post-docs, and also many of the invited speakers) in the power and scope of kinetic methods. This was in particular true for the main lectures provided by Degond, Guo and Klar (see highlights below).

Scientific Highlights:
Lectures by Degond, Guo and Klar (see below for titles; abstracts in an attachment). Degond gave three one-hour lectures on kinetic and fluid models describing flocking and milling effects among animal swarms, with birds, insects and sheep among the examples. Modeling, analysis (using sophisticated modern tools) and numerical simulations were given equal footing in these lectures. - Guo showed extensions of his powerful ideas involving L^p - estimates of the density distribution function of the Boltzmann equation to obtain better existence and uniqueness results for initial-boundary value problems of the Boltzmann equation. - Klar introduced the audience to a true industrial application of kinetic theory: the fibre dynamics of a slender fibre in turbulent flow, and the fiber laydown on a conveyor belt (a process which is used in non-woven textile production, where this problem originated). --- These three lecture series offered the audience a great cross-section of the variety and scope of kinetic theory and applications. --- Among the invited talks, highlights in the eye of this reporter include the talks by: --- Hakan Andreasson, who obtained and presented the best available results for the mass-radius ratio of spherically symmetric charged objects from studies of the Einstein-Vlasov-Maxwell system; --- Jose Carrillo, who discussed and analyzed kinetic models for swarming; modeling and long-term asymptotics were given special attention; ---

Ansgar Juengel, who presented analytical and numerical studies in electron transport and heating in semiconductor devices; --- Hyung-Ju Hwang, who presented impressive progress on initial-boundary value problems for the Vlasov-Poisson system. The inclusion of boundary conditions in this problem is a fairly novel development, and Hwang showed some of the pitfalls and tools arising in this context; --- Florian Mehats, whose topic was stable steady and self-similar blowup solutions for the three dimensional gravitational Vlasov-Poisson system in the relativistic case; --- Luc Mieussens, with a beautiful talk on numerical schemes for linear kinetic equations. The thrust of his work was to devise schemes that would retain their validity in the asymptotic diffusion limit. --- The vast majority of all other talks was of equally high quality and interest. The variety of subjects touched in the workshop was impressive and a sign of the wide applicability of kinetic methods.

Organizers:

Illner, Reinhard, Mathematics and Statistics, University of Victoria --- Degond, Pierre, Departement de Mathematique, University Paul Sabatier, Toulouse, France --- Guo, Yan, Department of Mathematics, Brown University, Providence, RI, U.S.A. --- Klar, Axel, Fachbereich Mathematik, Universitaet Kaiserslautern, Germany

Speakers:

Yan Guo, Department of Mathematics and Statistics, Brown University: An L^p - L^∞ Approach in the Boltzmann study --- Pierre Degond, Departement de Mathematique, University Paul Sabatier, Toulouse, France: Kinetic and Fluid Modeling of Complex Systems --- Axel Klar, Fachbereich Mathematik, Universitaet Kaiserslautern, Germany: Mathematical models for fibre dynamics and fibre laydown in a non-woven production --- Please see the attachments for the names, titles and abstracts of the other speakers.

Links:

For pdf files of all talks, see: <http://www.pims.math.ca/scientific/summer-school/topics-kinetic-theory>

Comments / Miscellaneous:

It was a resounding success from a scientific, social and recreational point of view.

File Uploads:

Additional Upload 1: http://www.pims.math.ca/files/final_report/Updated_List_of_Attendees.pdf

Additional Upload 2: http://www.pims.math.ca/files/final_report/Book_of_Abstracts.pdf

Additional Upload 3: http://www.pims.math.ca/files/final_report/Group_photograph.pdf
