



October 10, 2006

07pims011: SYMPOSIUM on KINETIC EQUATIONS and METHODS

Organizers:

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Location:

University of Victoria

PIMS Sites:

University of Victoria
University of British Columbia

Objectives:

Kinetic theory has seen much and dramatic activity in the last two decades; the most public example was of course the award of the Fields medal to Pierre-Louis Lions; his work on the Boltzmann equation was explicitly cited in this award. However, there have been many other profound results and trends, such as:

- the satisfactory treatment of fluid-dynamic limits of the Boltzmann equation, completing a program which was started in the late eighties by Bardos, Golse and Levermore, and separately by Esposito, Lebowitz and De Masi. The relatively recent completion of the program is attributed to L. St-Raymond, Paris.
- qualitative results for the spatially homogeneous Boltzmann equation for different types of interactions, including grazing collisions. Many distinguished mathematicians have contributed to this. I mention C. Villani, G. Toscani, and B. Wennberg.

- analytical studies of nonlinear kinetic equations arising in quantum physics, for example for the description of electron motions in semiconductors, or in Bose-Einstein condensates. A prominent representative of such work is Peter Markowich in Vienna, who won the Wittgenstein prize for his scientific achievement.
- work on other kinetic equations, for example the Vlasov-Maxwell system, which in spite of its importance in plasma simulation still offers deep mysteries. Much analytical effort into this system has been invested by W. Strauss, R. Glassey and G. Rein, and more recently by F. Golse, S. Klainerman and Staffilani.
- results on statistical foundations of kinetic and fluid dynamical equations as pioneered by R. Varadhan and his school. A prominent member of this school is F. Rezakhanlou in Berkeley, who is applying probabilistic machinery to obtain rigorous derivations of kinetic equations
- the spread of kinetic equations and methodology in applied science, for example in traffic flow studies, in biological contexts, even in sociology.
- finally (and this does by no means complete the list) the use of modern methodology (such as mass transportation methods) and their impact in kinetic theory.

Comments:

The main goal is to hold a meeting which attracts a select group at the very highest level in the field of kinetic theory. Over two days, they will give hour-long lectures on recent work in kinetic equations. It is expected that the conference will attract many listeners from the large international community. This is a very short symposium, consistent with the aim to get the very best in the field together in one place; people who already have heavy demands on their time. We anticipate that some of the other participants who travel long distances to attend (out of pocket) will plan longer stays in the area to engage in research with other PIMS scientists. The very high international profile of the event, and widely distributed announcement will generate a lot of exposure for PIMS during its 10-year celebration.

Audience:

This is a proposal for an international short symposium on kinetic theory with distinguished speakers from around the world. The conference would be one of the festive events to celebrate the 10th birthday of PIMS. It is suggested to hold the conference at the University of Victoria over two days in the spring of 2007; 8-10 presenters are being invited to speak for 1 hour about a subject of their expertise. We intend to advertise widely, and to attract quite a number of additional participants who would have to register and pay a (modest) fee to

participate and listen. It is not intended to have sessions for contributed talks, although we may experience pressure to do so, and we might have to reconsider. Students would be encouraged to attend along with their supervisors(or on their own) but we note that there is no provision in the budget to support student travel or local costs.

Participants:

Distinguished Plenary Lecture by:

P. Lions, Paris Dauphine (to be confirmed)

Other invited speakers

E. Carlen, Georgia Tech (spatially homogeneous Boltzmann eq.)

W. Strauss, Brown University (Vlasov-Maxwell eq.)

W. Craig, McMaster (water waves)

D. Levermore, Maryland (fluid dynamic limits)

P. Markowich, Vienna (Bose-Einstein condensates)

F. Rezakhanlou, Berkeley (stochastic foundations, confirmed)

C. Villani, Lyon (Boltzmann eq.)

C. Sulem, Toronto (Nonlinear Schroedinger eq.)

L. Caffarelli, Austin (mass transportation)

S. Takata, Kyoto (computational rarefied gas dynamics)

the topics listed after the names are topics to which the researcher has made fundamental contribution and about which he/she could speak; P. Lions has of course made such contributions to many, many fields

A backup list includes A. Bobylev (Karlstadt), Y. Guo (Brown), F. Golse (Paris VII), X. Lu (Beijing), G. Toscani (Pavia), T.-P. Liu (Stanford).

Amount Requested:

0.00

Expenditures:

4 international speakers @ \$ 2,000 = \$ 8,000

5 U.S. speakers @ \$ 1,000 = \$ 5,000

2 Canadian speakers @ \$ 0 = \$ 0

Local costs \$ 2,000

Total: \$ 15,000

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It is a bit difficult to budget for P. Lyons who will certainly require more than the international stipend above. We have had favourable discussions with Ivar Ekeland about paying for his trip with external funds -- this seems quite reasonable to us.

Income:

\$10,000 has been reserved for UVic activities under the PIMS 10-year banner. All these funds are available for use in this event. We intend to ask for modest conference fees from non-invited participants (there could be many) on the order of \$100 per person. Some of these fees could be used to provide hospitality more in keeping with the festive nature and high profile of the event.

Selected Dates:

Fri, April 27, 2007
Sat, April 28, 2007