

ESF RESEARCH CONFERENCES

RAPPORTEUR REPORT

Partnership ESF EMS ERCOM-INI

Conference Title: Highly Oscillatory Problems: From Theory to Applications

Dates: 12-17 September 2010

Chair: Prof. Arieh Iserles

Rapporteur: Prof. JM Sanz-Serna

Introduction. This conference is a follow-up of a similar one held, also in Cambridge, in the spring of 2007. Usually a mathematical field of research is unified by either an application topic (eg. conferences on the dynamics of populations, on imaging, etc.) or a mathematical technique (eg. conferences on linear algebra or Markov chains, etc.). Oscillatory problems do not follow that rule. Applications are manifold (this conference included presentations on material science, quantum chemistry, molecular dynamics, wave propagation, ...) and the techniques used cover an enormous range of mathematics (asymptotic expansions, homogenization, multiscale numerical techniques, special functions, Fourier analysis, ...). The reason for this peculiarity of highly oscillatory problems is that it may be said that they are defined in terms of what they are not rather in terms of what they are: a problem is highly oscillatory if its solution cannot be effectively described by conventional approximation ideas, such as Taylor expansions or related polynomial expansions. As a consequence highly oscillatory problems are both challenging and ubiquitous.

Quality. The quality of all the presentations was outstanding. At different moments we enjoyed the most unusual opportunity of having the privilege to listen to two or three talks in a row that reached the level of perfection both in contents and delivery. All talks were very well attended.

Atmosphere. The environment at the Isaac Newton Institute is extremely conducive to scientific discussions. In the breaks all blackboards in the building (and there are many) were used by groups of people discussing the presentations or working in ongoing cooperations. (Several speakers mentioned that their presentations at this meeting stemmed from ideas/problems they gathered at the previous 2007 meeting.)

I would have preferred if the chairpersons had invested more effort in taking a more proactive role in the discussions. Summaries by the chairperson of the points being debated, comparisons between different approaches etc are very welcome by the less experienced participants; I did not find enough of that sort of contribution.

Balance of participants. There were participants from virtually all large European countries and no nationality was predominant. The range of seniority covered from PhD students to world leaders.

Follow-up. As mentioned before I could see many co-operations starting or growing. A follow-up conference appears then to be necessary.

Organization and Infrastructure. It is difficult to conceive a place better suited to mathematical work than the Isaac Newton Institute. The meeting was very well

organized and Mrs. Piccolotto was universally found to be both helpful and capable. Some participants complained about the quality of the lunches; I do not take them and I cannot judge.

Summary. This conference was a big success and I think most people left with the idea their time in Cambridge had been very well spent having listened to great up-to-date talks and established valuable contacts.

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