

Report on the Junior Hausdorff Trimester Program

Computational Mathematics

February - April 2008

Computational aspects are nowadays almost omnipresent in mathematics. This is clear in areas like numerical analysis but as soon as one can relate mathematics to formulas computers can be used to either solve equations or to manipulate them symbolically. Of course, if the context involves continuous objects, approximations are necessary. When deciding this topic for the first Junior program, the scientific advisory board hoped that it would attract young mathematicians representing quite different areas of mathematics - and nevertheless being able to talk to each other.

This worked out very well. Six groups were invited and the titles show how broad the topic is - and how connected:

1. MIP-PDE: Solving discrete-continuous nonlinear optimal control problems with linear mixed-integer programming techniques
2. Adaptive computational stochastic partial differential equations
3. Numerical discretization methods for differential inclusions and applications to robust optimal control problems
4. Numerical methods in molecular simulation
5. Extreme geometric structures
6. Adaptive nonstandard finite element schemes

The last group played a special role since it was a group around a senior mathematician, Carsten Carstensen. His presence was not only a help for this group but he was also stimulating some of the other groups. Three of the groups organized small workshops:

1. MIP-PDE (Group 1)
2. Efficiency in and Modeling with Computational Stochastic Partial Differential Equations (Group 2)

3. Set valued Numerical Analysis and Robust Optimal Control (Group 3)

A lot of informal seminars took place and the program was very lively. The scientific output of the program is impressive. About 50 papers were written in connection with the program, most of which have by now been published or accepted in refereed Journals or conference proceedings.