Mathematisches Forschungsinstitut Oberwolfach

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Mathematical Aspects of Hydrodynamics

Organised by
Gregory Seregin, Oxford - St. Petersburg
Vladimir Šverák, Minneapolis

July 19th – July 25th, 2009

Abstract. The workshop was devoted to discussions of recent developments and possible future directions of research in the field of mathematical hydrodynamics. Many of the leading experts in the theory of PDE’s arising in fluid dynamics participated in this event. The topics included:

- Regularity, uniqueness and well-posedness problems for the Navier-Stokes equations
- Stability of Navier-Stokes solutions
- Open problems concerning the steady-state Navier-Stokes solutions
- Statistical approach to 2d hydrodynamics
- Inviscid limits of Navier-Stokes solutions
- Anomalous weak solutions of Euler’s equation
- Finding physically reasonable classes of weak solutions of Euler’s equations
- Local well-posedness of Euler’s equations in optimal spaces
- Stability of solutions of Euler’s equations
- Water waves
- Model equations
- Geometric approach to hydromechanical equations
- Selected compressible flow problems

Mathematics Subject Classification (2000): 35xx, 76xx.

Introduction by the Organisers

The workshop Mathematical Aspects of Hydrodynamics, organized by Gregory Seregin (Oxford - St. Petersburg) and Vladimir Šverák (Minneapolis) was held July 19th – July 25th, 2009. The meeting was well attended, more than 45 mathematicians participated. The program of the workshop consisted of 23 talks presented by leading researchers in Mathematical Fluid Mechanics coming from all
around the world. The main topics covered by the workshop lectures, addressed 2D and 3D Euler and Navier-Stokes equations (stationary and non-stationary), Quasi-Geostrophic Equation, Hydrostatic Boussinesq equation and other model equations (Euler-α, Navier-Stokes-Voight etc.).

The lectures stimulated many interesting discussions and exchanges of ideas. Many participants appreciated the opportunity to learn more about a variety of approaches and points of views.

In addition to the scientific program, there were two events which might be worth mentioning. The first one was the traditional Wednesday afternoon hike to Oberwolfach-Kirche. The second event was an outstanding informal concert on Friday evening by Charles Doering (guitar) and László Székelyhidi (violin).

Many participants suggested that a conference devoted to mathematical aspects of fluid mechanics become a regular Oberwolfach workshop.

The unique atmosphere of the Institute was a significant factor in the success of the meeting. As always, the Oberwolfach staff contributed greatly by the perfect organizational work. The organizers would like to express once more their thanks to the Institute for the support and the flawless organization.