



## Mathematisches Forschungsinstitut Oberwolfach

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### Oberwolfach Seminar

Analysis of Compressible Navier Stokes Equations and Related Topics

### Date/ID:

23 November - 29 November 2014 (1448a)

### Organizers:

Eduard Feireisl, Prague  
David Gérard-Varet, Paris  
Rupert Klein, Berlin  
Antonin Novotny, Toulon

### Programme:

The main goal of the proposed Seminar is to present and discuss the state of the art of the mathematical theory of complete fluid systems, with the emphasis put on the underlying thermodynamical principles. Highlighting the new emerging trends we aim to inspire young researchers in their future activities. The Seminar activities will be initiated by a series of tutorial courses focused on the following topics:

- Fundamental problems of well-posedness and stability of the systems of partial differential equations arising in the modeling of compressible, viscous, and/or heat conducting fluids. Several concepts of weak solutions, admissibility criteria, weak formulation based on the laws of thermodynamics.
- Multiscale analysis of complete fluid systems, dependence on the shape of physical domains, the role of boundary conditions.
- Asymptotic behavior of solutions, their qualitative properties, singular limits

### Literature:

- [1] G. K. Batchelor. *An introduction to fluid dynamics*. Cambridge University Press, Cambridge, 1967.
- [2] E. Feireisl and A. Novotný. *Singular limits in thermodynamics of viscous fluids*. Birkhäuser-Verlag, Basel, 2009.
- [3] D. Gerard-Varet. Formal derivation of boundary layers in fluid mechanics. *J. Math. Fluid Mech.*, 7(2):179–200, 2005.
- [4] D. Gérard-Varet and N. Masmoudi. *Homogenization and boundary layers*. *Acta Math.*, 209(1):133–178, 2012.
- [5] R. Klein. *Scale-dependent models for atmospheric flows*. In *Annual review of fluid mechanics*. Vol. 42, *Annu. Rev. Fluid. Mech.*, pages 249–274. Annual Reviews, Palo Alto, CA, 2010.
- [6] R. Klein, N. Botta, T. Schneider, C.D. Munz, S. Roller, A. Meister, L. Hoffmann, and T. Sonar. *Asymptotic adaptive methods for multiscale problems in fluid mechanics*. *J. Engrg. Math.*, 39:261–343, 2001.
- [7] N. Masmoudi. *Examples of singular limits in hydrodynamics*. In *Handbook of Differential Equations, III*, C. Dafermos, E. Feireisl Eds., Elsevier, Amsterdam, 2006.

**Deadline for applications:**

1 September 2014

The Oberwolfach Seminars are organized by leading experts in the field, and address postdocs and Ph.D. students from all over the world. The aim is to introduce the participants to a particular interesting development. The seminars take place at the Mathematisches Forschungsinstitut Oberwolfach. The Institute covers accommodation and food. By the support of the Carl Friedrich von Siemens Foundation, travel expenses can be reimbursed up to 150 EUR in average per person. Participants can ask for travel support during their stay in Oberwolfach at the guest office against copy of travel receipts. The number of participants of a seminar is restricted to 25.

**Applications** including:

- full name and address, including e-mail address
- short CV, present position, university
- name of supervisor of Ph.D. thesis
- a short summary of previous work and interest
- title, ID and date of the intended seminar

should be sent preferably by e-mail (pdf files) to:

**Prof. Dr. Dietmar Kröner**

Vice Director MFO

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