NEWSLETTER

of the Work Group Mathematical Fluid Mechanics

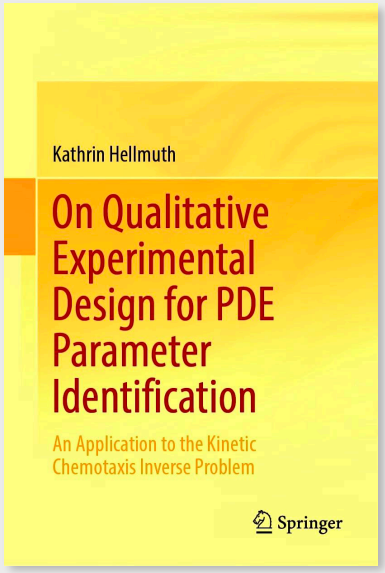
Newsletter no. 8 (2026)

News about a new book from our extended work group

Kathrin's book is about to be published

Kathrin Helmuth finished her PhD with us about a year ago. Her PhD thesis is about to be published by Springer Verlag, see e.g. *here*.

PDE parameter identification is an inverse problem. In this book (~250 pages) conditions are given to ensure uniqueness and stability of the parameter reconstruction. It also analyzes the structure of PDE solutions to provide guidance on data collection for the reconstruction, and on formulating and solving the numerical problem that implements the inversion process effectively.



Kathrin Hellmuth's first book, which comprises her PhD thesis, is about to be published by Springer Verlag. The cover of the book is shown here.

Impressions from the HYP 2026 conference

Last week (May 25 - 29, 2026) the conference "*20th International Conference on Hyperbolic Problems (HYP2026): Theory, Numerics and Applications*" took place in Stuttgart, Germany. There were about 260 participants, 16 invited lecturers and about 175 contributed lectures. Among both, the contributed and invited lectures, I found several gems. Also this was an opportunity to meet colleagues and also get to know new faces.

It was a special treat for me that James Glimm, who is 92 years old, attended the conference. He took great interest in the topics of the conference and also gave a talk.

A good number of members of our work group participated in the conference. - At the conference dinner I gave a historical overview of the subject of hyperbolic equations, with a focus on the compressible Euler equations.

Members of our extended workgroup at the conference dinner at HYP 2026.
From left to right, standing: Simon Markfelder, Mengni Li, Marlies Pirner, myself, Wasilij Barsukow
sitting: Yu-Chen Cheng, Simon Krotsch, Nikhil Manoj, Sophie Lauer

Jim Glimm together with myself at HYP 2026 in Stuttgart

News about papers from our work group

Paper with Emil Wiedemann & Simon Markfelder accepted

The paper *Christian Klingenberg, Simon Markfelder, Emil Wiedemann: "Maximal turbulence as a selection criterion for measure-valued solutions"* has been accepted to *Journal of Functional Analysis*.

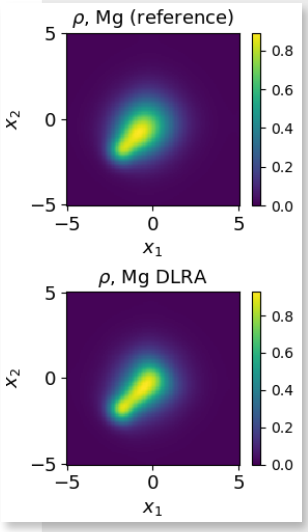
In the search for a good solution concept among measure valued solutions we propose a criterion to select relevant solutions, called "maximally turbulent".

In a follow-up study, Sophie Lauer in her PhD work is presently looking for numerical examples of our criterion.

Lena's paper accepted

The article *Lena Baumann, Lukas Einkemmer, Christian Klingenberg, Jonas Kusch: "A stable multiplicative dynamical low-rank discretization for the linear Boltzmann-BGK equation"* has been accepted to the journal *Kinetic and Related Models*.

The notoriously time consuming numerics of kinetic equations can be accelerated using a numerical method called dynamical low-rank approximation (DLRA). In this paper a modification of this method is given for which stability is proven. Herby the DLRA method is made even more efficient.



The numerical 2- dim. solution of a so-called beam test for the kinetic BGK equation is shown. On top one finds the numerical solution using a full solver. At the bottom our optimized dynamical low-rank solver is shown, without loss of fidelity. In addition it is almost twice as fast.

Upcoming scientific conferences

Click on the links and check where you might want to participate.

- June 1 - 5, **2026**: *Perspectives on Multiphase Fluid Dynamics, Continuum Mechanics and Hyperbolic Balance Laws* (ProHyp2026), in Strasbourg, organized by Philippe Helluy and others
- June 7 - 13, 2026: Summer School *"Methods & Models of Kinetic Theory"*, in Pesaro (Italy), organized by Maria Groppi and others
- June 21 - 26, 2026: *Solving ultimate challenges and network building: a coding and modelling week on and beyond hyperbolic equations* (SunHyp 2026) in Chania, Crete, organized by Elena Gaburro
- July 19 - 24, 2026: *17th World Congress on Computational Mechanics & 10th European Congress on Computational Methods in Applied Sciences and Engineering*, in Munich, Germany
- July 23 – 30, 2026: the *International Congress of Mathematicians* (ICM) in Philadelphia, USA.
- Sept. 7 - 11, 2026: *12th International Conference on Numerical Methods for Multi-Material Fluid Flow* (MultiMat 2026) at Biarritz, France, organized by Raphael Loubère and others
- Feb. 22 – 26 , **2027**: *SIAM Conference on Computational Science and Engineering (SCE27)*, in Pittsburgh, Penn., USA.
- June 20 - 25, 2027: *Numerical Methods for Hyperbolic Problems (NumHyp 2027)*, in Verona 2027 organized by Elena Gaburro
- July 5 - 9, 2027: *International Conference on Spectral and High-Order Methods* (ICOSAHOM 2027), in Milan organized by Marco Verani, Paola Antonietti and others
- July 12 – 16, 2027: *11th International Congress on Industrial and Applied Mathematics (ICIAM)*, in The Hague, The Netherland

News about a conference

International Congress of Mathematicians in 2026

The International Congress of Mathematicians (ICM) is the most prestigious of all mathematical conferences. It began in 1897, the next one was held in 1900, where David Hilbert announced his famous list of 23 unsolved mathematical problems. From then on the ICM is held every four years. Since 1936 the ICM awards the highly prestigious Fields medal. Being invited to give a talk at the ICM is considered among the highest honors in mathematics.

The next ICM will be held in Philadelphia, USA, during the week July 23 – 30, 2026, *see here*. While the guesswork is on, regarding the recipients of the Fields medal, the list of invited speakers has been released. Among them is *Felix Otto*, who works on partial differential equations.