

# NEWSLETTER

## of the Work Group Mathematical Fluid Mechanics

### *Newsletter no. 5 (2025)*

#### News about a submitted paper:

#### **Paper jointly with Simon Markfelder and Emil Wiedemann submitted**

The article "[\*Christian Klingenberg, Simon Markfelder, Emil Wiedemann: Maximal turbulence as a selection criterion for measure-valued solutions\*](#)" has been submitted.

This article discusses the seemingly intractable question on the correct solution concept for PDEs arising in fluid mechanics. Measure valued solutions are a solution concept that is too general. In this article a notion called maximal turbulence is defined, in order to come closer to a plausible solution concept.

#### News about an upcoming visitor:

#### **Praveen visits us May 10 - June 1**

[\*Praveen Chandrashekar\*](#), from the Tata Institute in Bangalore, India, will visit us for three weeks, May 10 - June 1. He is a leading expert in numerics for conservation laws.

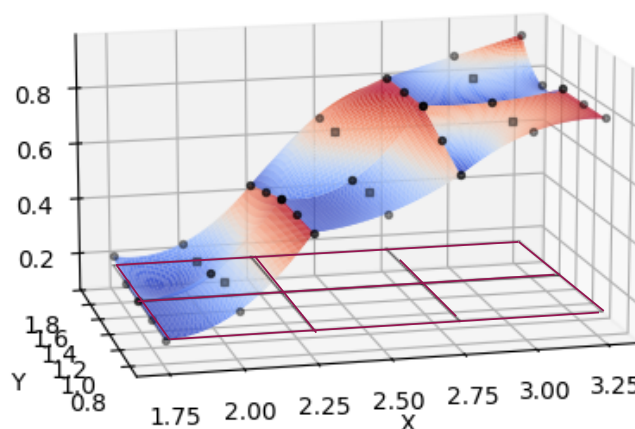
He will give two seminar talks on continuous Galerkin method for hyperbolic PDEs. Here the solution is numerically reconstructed in each computational cell, see the picture on the right. This needs to be complemented by a numerical stabilization method.

#### **Kathrin Helmuth's PhD defense scheduled for April 15**

After Kathrin Hellmuth submitted her PhD thesis, letters evaluating her thesis were requested. Once the letters had arrived, the members of our faculty of mathematics and computer science were given two weeks to review the thesis and the letters. This is finished and now Kathrin's PhD defense has been scheduled for Tuesday, April 15 at 3 pm in the seminar room of the building Emil Fischer Str. 41.

During Kathrin's defense, after having presenting her PhD thesis, she will be asked questions by her PhD committee.

Good luck, Kathrin!



Here we see six rectangular computational cells (violet). In each cell the solution of a PDE is reconstructed to third order (the blue and red surface) using the information given by the black dots. These six surfaces together give a continuous reconstruction.

This figure was made by Lisa Lechner in her paper with coauthors, [see here](#).

### News about an upcoming visitor:

#### **Mengni Li visits**

**April 27 - May 14**

I had introduced Mengni Li [here](#) (on page 2). Now she has received her visa to visit Germany, and will visit us in Würzburg from April 27 to May 14. Originally she had planned to visit longer, but her university wants her to return earlier.

Her lecture in our seminar is scheduled for Thursday, May 8, where she will give an introductory talk into her area of expertise, inverse scattering problems, which is a type of inverse problems.

### News about a submitted thesis:

#### **Simon Wenchel submitted his Master thesis**

Simon Wenchel submitted his Master thesis *"Solving the Allen-Cahn Equation Using Discontinuous Galerkin Methods with a Domain Decomposition Approach"*.

The processors in today's high performance computers tend to be graphics processing units (GPUs) instead of central processing units (CPUs). When computing PDEs this requires a high degree of parallelization with a small amount of information exchange between processors. The numerical concepts of this Master thesis goes towards achieving this.

### News about conferences:

#### **Workshop: Mathematics of compressible fluids**

June 24 - 27, 2025 both Dominic Breit and Philipp Öffner will organize a workshop in Clausthal, in the Harz mountains in Germany. It will be on the mathematics of compressible fluids.

For more details, [see here](#).

## **Upcoming scientific conferences**

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

- April 7 - 11, 2025: [Kinetic equations and turbulence](#) (Bardos' 85th birthday conference) in Gif-sur-Yvette (France, near Paris), organized by François Golse among others
- June 9 - 13, 2025: [Numerical methods for hyperbolic problems 2025](#) (NumHyp25), in Darmstadt, organized by Jan Giesselmann and others
- June 25 - 27, 2025: [Mathematics of compressible fluids - analysis and numerics](#), organized by Dominic Breit and Philipp Öffner in Clausthal, Germany
- June 24 - 27, 2025: [30th Biennial Conference in Numerical Analysis](#) in Glasgow, organized by persons from the University of Strathclyde, Glasgow
- July 13 - 18, 2025: [International Conference on Spectral and High-Order Methods](#) (ICOSAHOM), in Montreal, Canada
- July 28 - Aug. 1, 2025: [Applied Inverse Problems 2025](#) (AIP 2025), in Rio de Janeiro, Brazil
- Aug. 18 - December. 19, 2025: [Kinetic Theory: Novel Statistical, Stochastic and Analytical Methods](#), at the Simons Laufer Mathematical Sciences Institute in Berkeley, California, organized among others by Qin Li
- Sept. 1 - 5, 2025: [European Conference on Numerical Mathematics and Advanced Applications](#) (ENUMATH 2025) in Heidelberg, organized by Barbara Wohlmuth among others
- Sept. 14 - 20, 2025: [Hirschegg Workshop](#), in the Kleinwalsertal, Austria, organized by Ferdinand Thein and Gerald Warnecke
- Sept. 24 - 26, 2025: [Workshop on Hyperbolic Problems](#), in Nürnberg, organized by Emil Wiedemann and Nicola De Nitti
- November 17 - 20, 2025: [SIAM Conference on Analysis of Partial Differential Equations](#) (PD25), Pittsburgh, Pennsylvania, USA
- December 6 - 8, 2025: Workshop on Active Flux, in Shenzhen, China, organized by Rémi Abgrall and Alexander Kurganov
- sometime in **2026**: Finite Volume and Complex Applications 11, in Münster, Germany
- March 23 - 27, 2026: *Hyperbolic problems - a comprehensive approach*, in Würzburg, Germany, organized by Wasilij Barsukow, Simon Markfelder, Marlies Pirner, Fritz Röpke, Emil Wiedemann
- May 25 - 29, 2026: *20th International Conference on Hyperbolic Problems (HYP2026): Theory, Numerics and Applications*, in Stuttgart, Germany organized by Maja Lukacova und Christian Rhode

## **Kinetic Theory: Novel Statistical, Stochastic and Analytical Methods**

Near the University of California in Berkeley, money by the wealth patron Jim Simons has helped to finance a research institute, the *Simons Laufer Mathematical Sciences Institute*. They run semester programs on particular topics. This fall the topic will be *"Kinetic Theory: Novel Statistical, Stochastic and Analytical Methods"*, organized among others by Qin Li. - Kathrin Hellmuth plans to go there for a week.