NEWSLETTER

of the Work Group Mathematical Fluid Mechanics

Newsletter no. 11 (2025)

Article submitted by Lena Baumann et. al.

The article <u>Lena Baumann, Lukas</u> <u>Einkemmer, Christian Klingenberg,</u> <u>Jonas Kusch: "An adaptive dynamical</u> <u>low-rank optimizer for solving kinetic</u> <u>parameter identification inverse</u> <u>problems"</u> has been submitted to a journal.

This is the last paper during the PhD period of *Lena Baumann*. She had originally set out to study numerics of parameter identification problems for kinetic equations. For this an efficient numerical method for kinetic equations was needed (the low rank approach) which needed more time to develop than anticipated. Now, in the final period of Lena's PhD, she was able to apply this efficient numerical algorithm to the parameter identification inverse problem with the above paper.



The parameter to be determined from experimental data is the red line (marked *true*). The curves (with an initial guess being the blue curve marked *init*) show how the numerical algorithm converges to the true solution quickly. The low rank algorithm used here makes this algorithm quite efficient.

Our visit to NumHyp 2025

From June 9 to 13, 2025 the conference <u>Numerical methods for</u> <u>hyperbolic problems 2025</u> (NumHyp25) took place in Darmstadt, Germany, organized by Jan Giesselmann and others. It was attended by about 95 persons. There were about 40 lectures and about the same number of posters.

From our extended work group <u>Wasilij Barsukow</u>, <u>Junming Duan</u>, <u>Lisa Lechner</u> and myself took part. We presented posters and gave lectures on topics mainly related to the Active Flux method. There was quite a bit of interest in this numerical method, it was one of the talking points of the conference.



Lisa Lechner

myself Junming Duan at NumHyp 2025 in Darmstadt, Germany

Wasilij Barsukow



Junming Duan next to his poster on an asymptotic preserving Active Flux scheme.

News about conferences:

Invited speakers HYP2026

At the 20th International Conference on Hyperbolic Problems (HYP2026) in May 2026 the invited speakers have been decided. Here are some of them:

Elia Brue' (Milano, Italy) Tristan Buckmaster (NY, USA) Manuel Castro (Malaga, Spain) Gui-Qiang Chen (Oxford, UK) Eduard Feireisl (Prague) Francis Filbet (Toulouse, France) Gregor Gassner (Köln, Germany) Sigal Gottlieb (Dartmouth, USA) Katrin Grunert (Trondheim, Norway) Martina Hofmanová (Bielefeld, Germany) Lorenzo Pareschi (Ferrara, Italy) Ruiwen Shu (Univ. Georgia, USA) Lászlo Székelyhidi (Leipzig, Germany) Li Wang (Minnesota, USA)

Allow me to highlight one of the speakers, namely Elia Brue' <u>see here</u>.

Numerical Methods for the Kinetic Equations of Plasma Physics

Eric Sonnendrücker, director of the Max Planck Institute for Plasma Physics in Garching (near Munich) organizes a yearly workshop called *Numerical Methods for the Kinetic Equations of Plasma Physics (NumKin)*. The next one will take place from October 27 to 31, 2025 in Garching.

To get a feeling for this meeting, <u>see</u> <u>here</u> for the schedule of the talks of last year's NumKin2024.

NumHyp 2027

The bi-yearly conference Numerical Methods for Hyperbolic Problems (NumHyp) is a Euro-centered series of conferences that originally focussed on shallow water models, but has since expanded to many areas of numerics for conservation laws. We attended this year's NumHyp earlier this month.

The next NumHyp conference will take place in Verona. Italy in June 2027, organized by Elena Gaburro. Elena has been quite successful in organizing the <u>HONOM 2024</u> conference last year, which bodes well for for NumHyp2027.

Upcoming scientific conferences

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

- July 13 - 18, 2025: <u>International Conference on Spectral and High-Order Methods</u> (ICOSAHOM), in Montreal, Canada

- July 28 - Aug. 1, 2025: <u>Applied Inverse Problems 2025</u> (AIP 2025), in Rio de Janeiro, Brazil

- Aug. 18 - December. 19, 2025: <u>Kinetic Theory: Novel Statistical,</u> <u>Stochastic and Analytical Methods</u>, at the Simons Laufer Mathematical Sciences Institute in Berkeley, California.

- Sept. 1 - 5, 2025: <u>European Conference on Numerical Mathematics and</u> <u>Advanced Applications</u> (ENUMATH 2025) in Heidelberg, organized by Barbara Wohlmuth among others

- Sept. 14 - 20, 2025: <u>*Hirschegg Workshop*</u>, in the Kleinwalsertal, Austria, organized by Ferdinand Thein and Gerald Warnecke

- Sept. 24 - 26, 2025: <u>Workshop on Hyperbolic Problems</u>, in Nürnberg, organized by Emil Wiedemann and Nicola De Nitti

- Oct. 23 - 24, 2025: <u>Women in PDEs</u> in Karlsruhe, organized among others by Marlis Hochbruck

- Oct. 27 - 31, 2025: Numerical Methods for the Kinetic Equations of Plasma Physics (NumKin 2025), organized by Eric Sonnendrücker in Garching (near Munich)

- November 17 - 20, 2025: <u>SIAM Conference on Analysis of Partial</u> <u>Differential Equations</u> (PD25), Pittsburgh, Pennsylvania, USA

- December 6 - 8, 2025: Workshop on Active Flux, in Shenzhen, China, organized by Rémi Abgrall and Alexander Kurganov

- March 23 - 27, **2026**: <u>Hyperbolic problems - a comprehensive</u> <u>approach</u>, in Würzburg, Germany, organized by Wasilij Barsukow, Simon Markfelder, Marlies Pirner, Fritz Röpke, Emil Wiedemann

- March 30 - April 4, 2026: International Conference on high-order nonlinear numerical methods for evolutionary PDE (HONOM) in Trento, Italy, organized among others by Michael Dumbser

- 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

- one week in June **2027**: Numerical Methods for Hyperbolic Problems (NumHyp 2027), in Verona 2027 organized by Elena Gaburro



Verona, Italy