

NEWSLETTER

of the Work Group Mathematical Fluid Mechanics

Newsletter no. 16 (2025)

Paper by Lisa Lechner accepted

The article Wasilij Barsukow, Praveen Chandrashekar; Christian Klingenberg; Lisa Lechner: "A generalized Active Flux method of arbitrarily high order in two dimensions", Computers & Fluids (2025) has been accepted for publication by Computer and Fluids.

This is the first time the Active Flux method has been made high order. It has generated some interest. The arXiv preprint from 8 months ago has already been cited in 6 other preprints.

Paper by Junming Duan submitted

The article Junming Duan: "A fourth-order active flux method for parabolic problems with application to porous medium equation" has been submitted for publication.

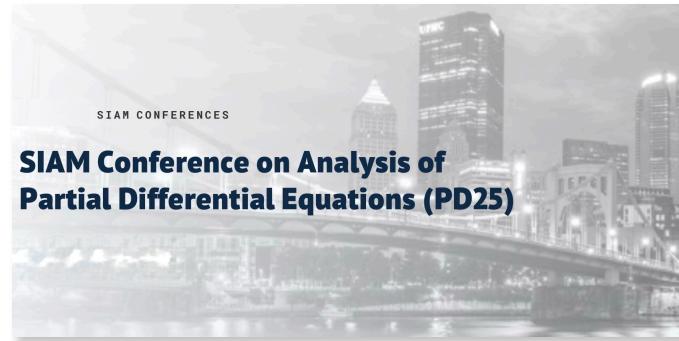
Here the *semi-discrete* Active Method (AF) is applied to parabolic PDEs. Phil Roe had studied this before for the *fully discrete* AF method, but there are more differences here. Also compared to DG methods, this new method runs more efficiently.

Paper submitted by Kathrin Hellmuth

Kathrin Hellmuth submitted the article Kathrin Hellmuth, Ruhui Jin, Qin Li, Stephen J. Wright: "Data selection: at the interface of PDE-based inverse problem and randomized linear algebra".

This is a well-written review paper on a timely subject. Given an experiment that is modeled by a PDE with a free parameter. Numerical methods are described that select the optimal design of the experiment. For this randomized numerical linear algebra is used.

Our mini-symposium at the SIAM Conference on Analysis of Partial Differential Equations

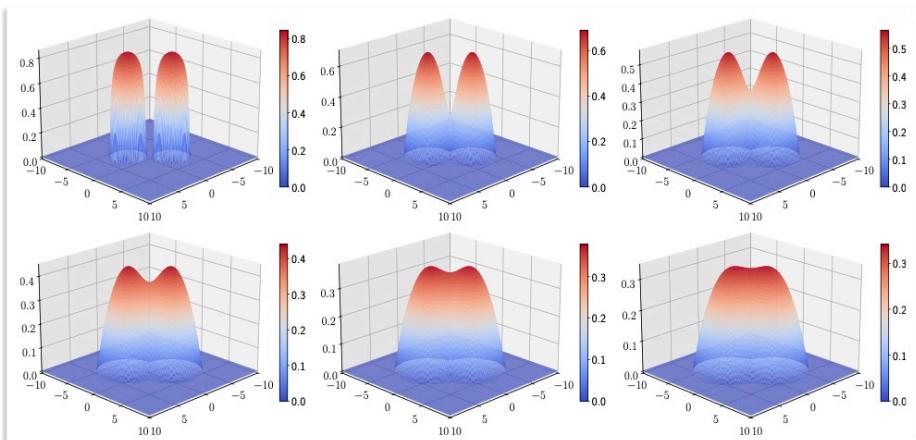


The Society for Industrial and Applied Mathematics (SIAM) is an American applied math association. It not only has (excellent) journals but also runs conferences, usually on a bi-yearly basis.

The SIAM Conference on Analysis of Partial Differential Equations (PD25) will be held in Pittsburgh, USA November 17 - 20, 2025. The main part of the conference consists of contributed mini-symposia. Simon Markfelder and myself have submitted a mini-symposium titled "*What are good solution concepts for the PDEs of fluid mechanics?*". Given the non-uniqueness results for weak solutions of fluid mechanics PDEs, are there other solution concepts that make sense?.

Kathrin Hellmuth will also attend and contribute to a mini-symposium organized by Qin Li.

This simulation from Junming's paper shows the numerical solution on a 100x100 grid of a degenerate diffusion equation $u_t = (u^m)_{xx} + (u^m)_{yy}$ at initial time top right and consecutive times. Notice the good resolution of the sharp corner where the solution becomes zero.



Fritz Röpke's Winter Workshop

The numerical astrophysicist Fritz Röpke is organizing his yearly workshop XIX Winter Workshop on Stellar Astrophysics 2025 Dec 15 - 17 in Heidelberg. The postdoc Nikhil Manoj, the master student Simon Krotsch and myself will attend on Dec. 16.

DFG contributes funding to the hyperbolic conference in Würzburg

The March 23 - 27, 2026 conference Hyperbolic problems - a comprehensive approach in Würzburg, Germany has received financial support from the German Science foundation. This will make it easier to run this conference.

Sonnendrücker's NumKin25

Check out the list of speakers to this workshop [here](#).

Students presenting in my seminar

Mathematics students at Würzburg University are required to present a piece of mathematics in form of a seminar talk. I offer such seminar courses every semester. This is an opportunity for the students to get to know my broader research interests, and in some cases it then leads to Bachelor and Master theses under my supervision.

This semester 14 students signed up, you can find the schedule of their seminar talks [here](#).



Upcoming scientific conferences

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

- 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: 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
- Dec 15 - 17, 2025: XIX Winter Workshop on Stellar Astrophysics 2025, organized by Fritz Röpke in Heidelberg
- March 23 - 27, 2026: Hyperbolic problems - a comprehensive approach, in Würzburg, Germany, organized by Wasilij Barsukow, Simon Markfelder, Marlies Pirner, Fritz Röpke, Emil Wiedemann
- March 25 - 27, 2026: 5th European Conference on Non-Equilibrium Gas Flows (NEGF26), in Toulouse, France, organized by Stéphane Colin among others
- 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
- 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
- mid June 2027: Numerical Methods for Hyperbolic Problems (NumHyp 2027), in Verona 2027 organized by Elena Gaburro
- late June/early July 2027: International Conference on Spectral and High-Order Methods (ICOSAHOM 2027), in Milan organized Marco Verani among others

Our webinar has been announced

The journal Computation has organized a webinar called 'Genuinely multi-dimensional numerical scheme for conservation laws' that will be held on Tuesday, Oct. 28, 2025 from 3 - 4:30 pm CET. The speakers are Wasilij Barsukow, Junming Duan, myself. For details and how to attend, [click here](#).



Computation
2025
Webinars

Genuinely Multi-Dimensional Numerical Scheme for Conservation Laws

28 October 2025, 3:00 pm (CET), 10:00 am (EDT)



Chair
Prof. Christian Klingenberg



Speaker
Dr. Wasilij Barsukow



Speaker
Dr. Junming Duan



