

NEWSLETTER

of the Work Group Mathematical Fluid Mechanics

Newsletter no. 6 (2026)

News about a papers from our work group

Paper with Simon Krotsch submitted

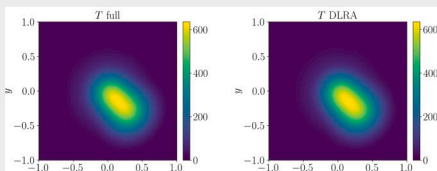
The paper Wasilij Barsukow, Christian Klingenberg, Simon Krotsch: "On the equivalence of semi-discrete Active Flux and Discontinuous Galerkin methods and a comparison of their performance" has been submitted to a journal.

Here a correspondence between the discontinuous Galerkin (DG) and the Active Flux method is explained. In certain instances these two methods are equivalent. It is then shown that Active Flux seems to be much more efficient than DG.

Lena Baumann's paper accepted

The article Lena Baumann, Lukas Einkemmer, Christian Klingenberg, Jonas Kusch: "An energy stable and conservative multiplicative dynamical low-rank discretization for the Su-Olson problem" has been accepted for publication in the Journal of Computational and Applied Mathematics.

A reduced order numerical method is applied to a kinetic radiative transfer equation. The method is such that energy conservation and local mass conservation can be proven.



A 2-dim simulation of a beam is shown, on the right with the full solver, on the left with the reduced order method from the paper. The fact that they look the same illustrates how well the new method works.

Newsletter no. 6 (2026) (two pages)

German Science Foundation grant approved

The German Science Foundation (DFG) is funding a priority program for conservation laws, running for two times three years, where they pay for about 20 PhD positions for research in this field at German universities. The program has run for three years, and applications for the second three years were due a few months ago. In order to decide the successful applications, the referees met all applicants in person on April 28 in Mainz. A partial list of the referees are: Michael Dumbser, Helge Holden, Gabriella Puppo, Eitan Tadmor. We all stood by our posters and were questioned by the referees. Afterwards they sat together and decided.

I had written an application on the Active Flux method together with Wasilij Barsukow. Fortunately this has now been approved.

SPP 2410 Hyperbolic Balance Laws in Fluid Mechanics: Complexity, Scales, Randomness (CoScaRa)

Christian Klingenberg, Dept. of Mathematics, University of Würzburg cooperation partner in France: Wasilij Barsukow, CNRS, University of Bordeaux, France project staff planned for the 2nd funding period: Simon Krotsch

17 A structure-preserving compact high-order method for multi-dimensional hyperbolic systems: singular limits, implicit methods energy conservation

our numerical method

Inspired by Phil Roe's Active Flux method we solve conservation laws in multi-dim. by a continuous Galerkin representation with stabilization via upwind point updates. We use a semi-discrete approach.

in the first period of this priority program

We have proven for linear systems of conservation laws this method is

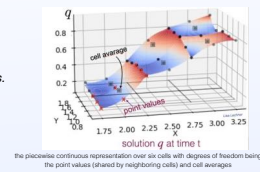
- stationary preserving
achieves the low Mach limit
is asymptotic preserving

without modification of the scheme.

We have applied this to many first order systems, linear and nonlinear in 2 and 3 space dimensions



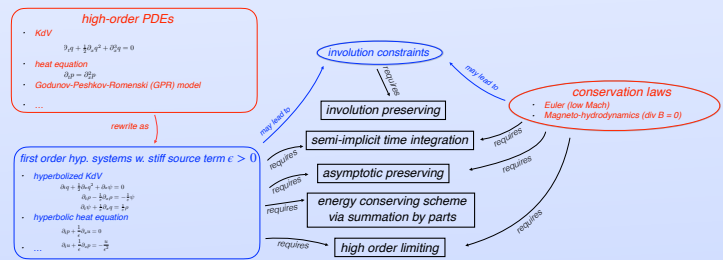
Supersonic compressible Euler flow past a forward facing step; notice the beautiful ripple of the horizontal slip-line. This Active Flux simulation is from Duan, Barsukow, Klingenberg, SAM Journal on Scientific Computing, vol. 47, no. 2 (2025)



the piecewise continuous representation over six cells with degrees of freedom being the point values (shared by neighboring cells) and cell averages

some of our recent literature: Wasilij Barsukow, Christian Klingenberg, Simon Krotsch: On the equivalence of semi-discrete Active Flux and discontinuous Galerkin methods and a comparison of their performance arXiv:2023.10.165 (2026) ...

in the second period of this priority program we plan to extend this to high order PDEs



result: a new highly accurate numerical method for a broad class of hyperbolic problems

this project's research in the context of SPP 2410: this numerical approach is ideally suited to simulate turbulent flow we plan to cooperate within SPP 2410 with project 6 (Engwer/Ranocha) & 21 (Ortleb), proving stability via summation by parts ...

the poster with which we presented our project to the referees

News about a new thesis student

Sophie Lauer begins her PhD with us

[Sophia Lauer](#) began her PhD studies with us. She will try to find useful solution concepts for the multi-dim. compressible Euler equations.

In [Simon Markfelder's](#) book the technique is explained, with which one shows that weak entropy solutions to multi-dim. Euler often are not unique. Thus the question arises if a new notion of the solution could alleviate this problem.

Lecture Notes in Mathematics 2294

Simon Markfelder

Convex Integration Applied to the Multi-Dimensional Compressible Euler Equations

Springer

Sophie Lauer received a stipend for her PhD studies



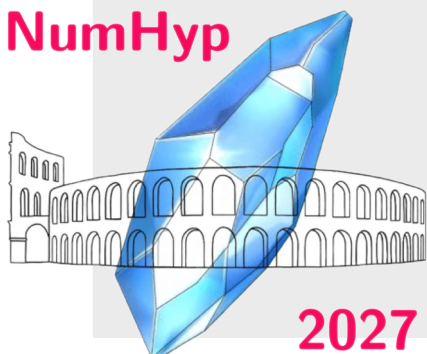
Sophie Lauer has received a PhD stipend by the Protestant Academic Foundation Villigst. This way she will be financially independent until 2029 in order to work on her doctoral studies.

News about a conferences

NumHyp 27 has a webpage

Every two years the Numerical Methods for Hyperbolic Problems (NumHyp) conference takes place to exchange new ideas on numerical methods for hyperbolic partial differential equations. The next one will take place in Verona June 20 - 25, 2027, organized by Elena Gaburro. It now has a web page, [NumHyp 2027](#). The submission of abstracts for contributed talks will take place in fall of 2027.

NumHyp



2027

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Upcoming scientific conferences

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

- May 4 - 8, **2026**: [Sharing Higher order Advanced Research Knowledge on Finite Volume](#) (SHARK-FV 2026) in Minho, Portugal, organized by Raphael Loubère and others
- 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
- 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
- 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
- 5 - 9 July 2027: [International Conference on Spectral and High-Order Methods](#) (ICOSAHOM 2027), in Milan organized by Marco Verani, Paola Antonietti and others
- 12 - 16 July 2027: [11th International Congress on Industrial and Applied Mathematics \(ICIAM\)](#), in The Hague, The Netherland

The Würzburg conference on hyperbolic problems in March 2026

One now can find four pages of pictures on the [Conference Hyperbolic problems - a comprehensive approach](#) that took place in Würzburg March 23 - 27. You can find [them here](#).



Many participants of the Würzburg conference on Hyperbolic Problems March 23 - 27, 2026.