# NEWSLETTER

of the Work Group Mathematical Fluid Mechanics

Newsletter no. 14 (2024)

Paper with Lisa Lechner & Wasilij Barsukow submitted

The paper *Wasilij Barsukow, Janina Kern, Christian Klingenberg, Lisa Lechner: "Analysis of the multi-dimensional semi-discrete Active Flux method using the Fourier transform"*, has been submitted to a journal.

Here properties of the two and three space dim. Active Flux numerical method for hyperbolic problems are analyzed using the Fourier transform. This way one sees its stationarity preserving property and how the stability of the scheme is not governed by non-physical modes. The latter can be a typical problem for other finite volume methods.
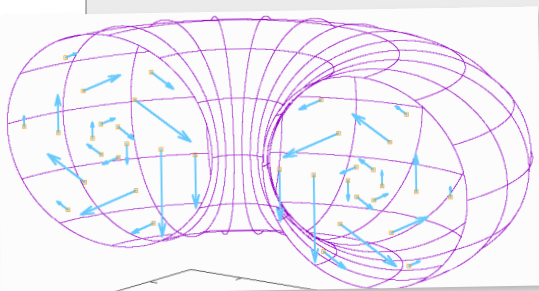
A stationary solution of the acoustic equation in three space dimensions, namely a *vortex ring*. The stationarity preserving property of the Active Flux method maintains this solution.

The date for HYP 2026 is set

The next International Conference on Hyperbolic Problems (HYP 2026) is scheduled to take place in Stuttgart July 20 - 24 of July in 2026.

Merry Christmas!

This is the last Newsletter of this year. On the right you see my remaining academic travels in 2024.

- a visit to Fritz Röpke's *Winter Workshop* together with Lisa Lechner, where we both will give talks.

- a visit to Abu Dhabi for a large *conference on differential equations*. I will give two lectures there, one in a mini-symposium organized by Kui Ren, another in one organized by Qin Li.

Dezember		
8 So		
9	Fritz Röpke's workshop in Heidelberg	
10 Di		
11 Mi		
12 Do		
13 Fr		
14 Sa		
15 So		
16 Mo		51
17 Di	14th AIMS conference on differential equations	
18 Mi	Abu Dhabi, UAE	
19 Do		
20 Fr		
21 Sa		
22 So		
23 Mo		52
24 Di	Heiligabend	

Kathrin will lecture in a workshop in Japan

Osaka Castle during the cherry blossom

Leon Bungert is co-organizing a workshop in Japan called *Synergies of Machine Learning and Numerics* March 11-13, 2025 in Osaka, Japan.

Kathrin Hellmuth is will give an invited lecture there.

Paper with Junmimg Duan accepted

The paper *Junming Duan, Wasilij Barsukow, Christian Klingenberg: "Active flux methods for hyperbolic conservation laws – flux vector splitting and bound-preservation"* has been accepted for publication in the *SIAM Journal on Scientific Computing*.

I had reported on this paper *here*.

Paper with Wasilij accepted

The paper *Rémi Abgrall, Wasilij Barsukow, Christian Klingenberg: "The Active Flux method for the Euler equations on Cartesian grids"* has been accepted for publication in the Springer *Journal of Scientific Computing*.

This paper gives the first implementation of the so-called generalized Active Flux method in two space dimensions. It is the precursor to the above paper with Junming Duan.
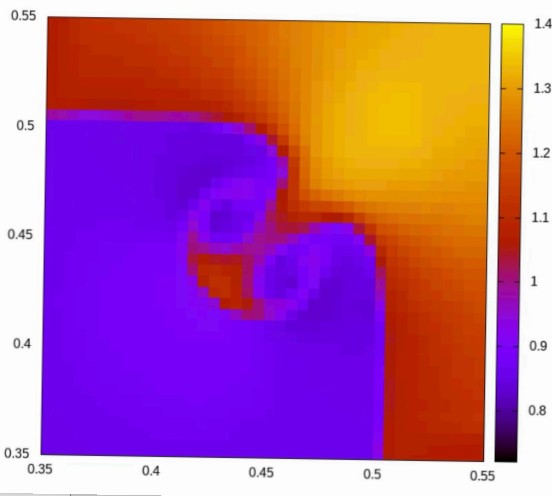
The yellow/red flow on the top right penetrates the violet flow on the bottom left. The generalized 2-dim Active Flux scheme can resolve the resulting vortex even on a coarse grid.

SIAM PDE 2025

Every two years SIAM usually organizes a meeting on the theory of PDEs. The last meeting took place online in March of 2022.

Now the next such meeting is scheduled: the SIAM Conference on Analysis of Partial Differential Equations (PD25) will take place in Pittsburgh, Pennsylvania, USA November 17 – 20, 2025. The Call for Participation is scheduled to be posted online in late February 2025.

Upcoming scientific conferences

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

- Dec. 9 - 11, 2024: *XVIII "Würzburg" Winter Workshop on Stellar Astrophysics 2024,* in Heidelberg, organized by Fritz Röpke

- Dec. 16 - 20, 2024: *14th AIMS conference on differential equations*, in Abi Dhabi, UAE, organized by the *American Institute of Mathematical Sciences* (AIMS)

- March 3 - 7, **2025**: *SIAM Conference on Computational Science and Engineering (CSE25)*, in Fort Worth, Texas, USA

- March 11- 13, 2025: *Synergies of Machine Learning and Numerics*, in Osaka, Japan, organized among others by Leon Bungert

- March 10 - 11, 2025: Annual Meeting of the DFG Priority program on Hyperbolic equations, in Darmstadt, organized by Martin Oberlack

- June 9 - 13, 2025: *Numerical methods for hyperbolic problems 2025* (NumHyp25), in Darmstadt, organized by Jan Giesselmann and others

- 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

- 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 others

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

- sometime in **2026**: Finite Volume and Complex Applications 11, in Münster, Germany
- July 20 - 24, 2026: 20th International Conference on Hyperbolic Problems: Theory, Numerics and Applications, in Stuttgart, Germany organized by Maja Lukacova und Christian Rhode

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Lukas Einkemmer visits us Jan. 12 - 15, 2025

Lukas Einkemmer will visit us Jan. 12 - 15, 2025. He collaborates with Lena Baumann and myself on a numerically efficient method applied to kinetic equations, the dynamical low rank method. His visit will be from Monday to Wednesday, so that week our seminar will be moved from Thursday to Wednesday.

Marlies Pirner will visit us

Marlies Pirner plans to visit us one week early in February 2025. Possibly her visit will coincide with our semester-end party, scheduled for Feb. 7.