

NEWSLETTER

of the Work Group Mathematical Fluid Mechanics

Newsletter no. 12 (2025)

We attended at a conference in Montréal, Canada

The [*International Conference on Spectral and High-Order Methods*](#) (ICOSAHOM) is a conference on numerics of differential equations. It took place in Montréal, Canada from July 13 - 18. [Lisa Lechner](#) and myself attended. [Junming Duan](#) also planned to attend, but was not granted a visa to enter Canada.

We had submitted a mini-symposium (which is a series of talks) on the Active Flux method. Our speakers were: Phil Roe, Rémi Abgrall (via Zoom), Junming Duan (via Zoom), Maria Han Veiga, Lisa Lechner, Amelie Porfetye, Xianyi Zeng, and myself. In addition Lisa and myself gave a second presentation in another mini-symposium. All these talks were an opportunity to present recent progress that had been made in Active Flux, which was well received.

Discussions with other participants of the conference on related topics, meeting colleagues known from before and making new acquaintances all made this a worthwhile visit.

Mengni Li has been awarded a Humboldt fellowship

Mengni Li is a mathematician from China. She obtained her PhD in 2022 from Tsinghua University, Beijing, China. Her topic is inverse scattering theory in magneto-hydrodynamics. For her papers [see here](#). She is a lecturer at Southeast University in Nanjing, China.

She has now been awarded a fellowship by the Humboldt foundation to visit us in Würzburg. She plans to arrive later this year and stay for two years.

Wasilij received a French ANR grant

[Wasilij Barsukow](#) has a permanent research position with the CNRS in Bordeaux, France. He had applied for a research grant from the French Agence National de Recherche (ANR) called *Involution preserving high-order compact numerical methods in multiple dimensions*.

He has now been awarded the grant. It runs for four years with money for a PhD position plus one year of post-doc.

Congratulations, Wasilij!



Mengni Li

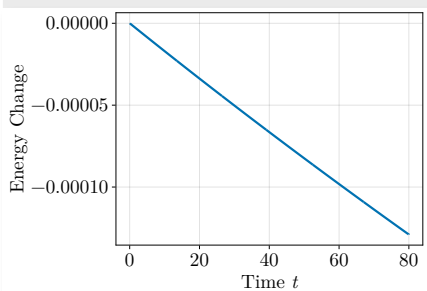


Participants of our mini-symposium on Active Flux at the ICOSAHOM 2025 conference in Montréal.
standing from l.t.r.: myself, Xianyi Zeng, Amelie Porfetye, Lisa Lechner, Maria Han Veiga.
sitting: Phil Roe, his wife Jacqui.

News about a papers:**Paper by Wasilij Barsukow,
Lisa Lechner and others
submitted**

The article [Wasilij Barsukow, Christian Klingenberg, Lisa Lechner, Jan Nordström, Sigrun Ortleb, Hendrik Ranocha: "Stability of the Active Flux Method in the Framework of Summation-by-Parts Operators"](#) has been submitted to a journal.

For a given PDE one typically determines the change of energy in time by multiplying the PDE by the solution, integrating over space and then integrating by parts. Doing the analogous thing for a numerical discretization of a PDE (doing summation by parts) has been achieved for the first time in this paper for the Active Flux method. Whereas on the PDE level the energy norm typically is the L^2 - norm, finding the right norm for Active Flux was quite tricky.



Here you see numerical evidence of what was proven in the above paper: $\frac{d}{dt}\|u\|_M^2 \leq 0$, where the subscript M indicates the new norm one has to find for Active Flux. In this figure the change of the discrete energy over time compared to the initial energy can be seen.

**Paper with Yunguang Lu
et. al. accepted**

The article [J.J. Chen, Q.Q. Fang, C. Klingenberg, Y.-G. Lu, X.X. Tao, N. Tsuge: "Global \$L^\infty\$ Entropy Solutions to System of Polytopic Gas Dynamics with a Source"](#), *Journal of Differential Equations (2025)* has been accepted for publication by the *Journal of Differential Equations*.

Proving existence of weak solutions to systems of conservation laws in one space dimension can be challenging. Even if one finds approximations to the solution that lie in a compact set, a convergent subsequence will only lead to a measure valued solution. Proving that this limit actually is a weak solution has been achieved for the system of equations given in this paper.

Upcoming scientific conferences

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

- 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.
- 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
- Oct. 23 - 24, 2025: [Women in PDEs](#) 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: [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
- 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 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 Loubere and others
- mid June **2027**: Numerical Methods for Hyperbolic Problems (NumHyp 2027), in Verona 2027 organized by Elena Gaburro

James Nguyen submitted his Bachelor thesis

James Nguyen has submitted his Bachelor thesis on the Riemann Problem for gas dynamics. Writing down the formulas for all possible solutions takes many pages. Below one sees one possible solution.

