Christian Klingenberg 26. May 2024

NEWSLETTER

of the Work Group Mathematical Fluid Mechanics

Newsletter no. 7 (2024)

Kathrin Hellmuth gave an online talk at Caltech

Kathrin Hellmuth is in the midst of writing up her thesis. This lead her to reappraise what she has achieved under a new heading she calls *identifiablity analysis for PDEs*: how experiments should be set up, such that these measurements are able to identify unknown parameters in PDE models of the experiments.

Her work has caught the attention of the work group of *Franca Hofmann* at *Caltech*, a renown university in the USA. That is why on May 24 she gave a seminar talk there via Zoom, titled: *Identifiability Analysis for a Kinetic Chemotaxis Model - Reconstruction of the mesoscopic chemotactic scattering kernel from macroscopic data*. Let us wish that this will lead to more cooperations with Franca.

Submissions to HONOM accepted

In September there will be a conference on high order numerical methods for hyperbolic equations *HOMOM 2024* in Crete, organized by *Elena Gaburro*.

Wasilij Barsukow, Junming Duan, Lisa Lechner, and myself submitted contributed talks there on various aspects of the Active Flux finite volume numerical method. All four submissions have now been *accepted* as oral contributions! The organizers clearly find the Active Flux topic quite interesting.

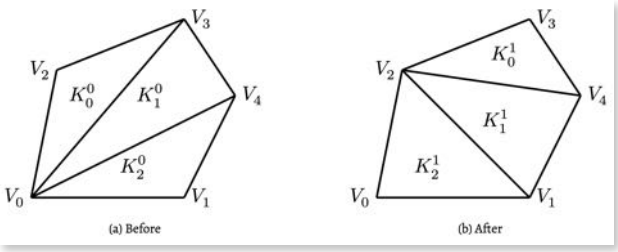
Jayesh Badwaik submitted his PhD thesis

Before Jayesh Badwaik began his PhD thesis with us in Würzburg, he was a Master student at the *Tata Institute in Bangalore*, the place where *Praveen* is working.

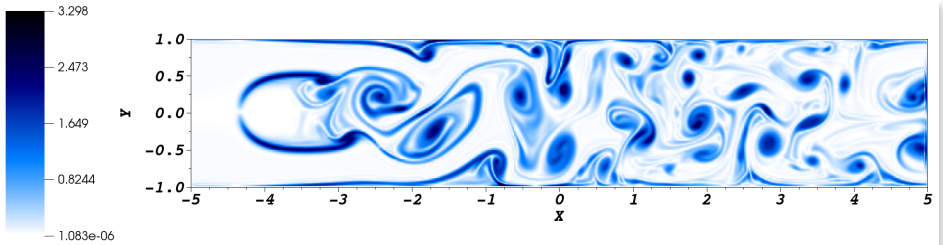
In 2016 he began his thesis in Würzburg by devising a triangular moving mesh for conservation laws. The plan was to do the remeshing locally by face swaps. While working on the two space dimensional moving mesh case, his research became quite involved, which (among other things) in 2020 led him to put his thesis on the back burner. He began to work as a researcher for the Jülich Forschungszentrum (in Germany).

During his years in Würzburg, Jayesh had gotten involved in two additional projects with visitors of ours: Nils-Henrik Risebro from Oslo (numerics of porous media flow with uncertainty) and Philippe Helluy from Strasbourg (a kinetic numerical solver for the Euler equations). This resulted in papers, which (together with his moving mesh papers) form the basis of a cumulative PhD thesis (*see here*), which Jayesh has now submitted.

Two referee reports will be written next. Once they are finished and they both recommend acceptance of his PhD thesis, it will be time to plan for his defense.



A local *re*mesh: for a triangular moving mesh, in time the triangles may become too elongated (a). A local remesh by swapping faces of triangles (b) results in a mesh that is more even. This is from Part II of Jayesh's PhD thesis.



Flow around cylindrical obstacle, vorticity is shown. The flow behind a cylinder begins to become turbulent. This simulation is computed using a so called kinetic method for the Euler equations. This is from Part III of Jayesh's PhD thesis.

Simon Wenchel began his Master thesis

Simon Wenchel began his Master thesis with us. He is working on it remotely.

While working at the *Forschungszentrum Jülich* he will do a GPU implementation of the discontinuous Galerkin method applied to the Cahn-Hillard equations. This topic is timely, because of the fact that a number of CPU super-computers will he substituted by GPU super-computers. Jülich is one of the three large super-computer centers in Germany.

Simon Wenchel is being co-advised by Matthias Bolten, a professor at Wuppertal University.

Annual meeting of the German Inverse Problem Society

The so-called *German speaking inverse probelm society* runs a conference once a year. Last year their conference was held in Würzburg. There Kathrin Hellmuth gave a lecture.

The next annual meeting will take place in Siegen Sept. 25 - 27, 2024.

view of Siegen, Germany

Talks in my student seminar

Every semester I run a literature seminar for Bachelor and Master students. This semester there will be 12 talks. You can find them *here*.

Upcoming scientific conferences

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

- June 5 - 7, 2024: *Analysis of dissipation in compressible and inviscid fluids*, in Konstanz, Germany, organized among others by Emil Wiedemann

- July 1 - 5, 2024: *XIX International Conference on Hyperbolic Problems: Theory, Numerics and Applications (HYP 2024)* in Shanghai, China, at Shanghai Jiao Tong University, organized by Yachun Li & Ya-Guang Wang

- July 8 - 11, 2024: *Modern Perspectives in Applied Mathematics: Theory and Numerics of PDEs* in Zürich, organized by Sid Mishra

- Aug. 26 - 30, 2024: *11th International Conference on Multi-Material Fluid Flow (MultiMat 2024)* in Colorado, USA, organized by the Lawrence Livermore National Laboratory, USA

- Sept. 9 - 13, 2024: *Conference on high-order nonlinear numerical methods for evolutionary PDEs* (HONOM2024) on the Crete Island, Greece, organized by Elena Gaburro

- Sept. 25 - 27, 2024: *Annual Meeting of the German-Speaking Inverse Problems Society 2024*, in Siegen (Germany)

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

- June 9 - 13, 2025: NumHyp 2025, in Darmstadt

- Sept. 14 - 20, 2025: Hirschegg Workshop, in the Kleinwalsertal, Austria, organized by Gerald Warnecke and others

- fall of 2025: SIAM Conference on Analysis of Partial Differential Equations (PD25), somewhere in the USA

- sometime in **2026**: Finite Volume and Complex Applications 11, in Münster, Germany

Maria Han-Veiga cancelled her visit to Würzburg

Maria Han-Veiga had planned to visit us in Würzburg. Unfortunately she had to cancel her visit because she needs the time to tend to her mother.