NEWSLETTER

of the Work Group Mathematical Fluid Mechanics

Newsletter no. 25 (2021)

Würzburg Mathematics Colloquium

Below please find the list of this semester's Mathematics Colloquium.

The first speaker (next Tuesday) Rupert Frank is quite well known, so you might consider attending his lecture.

My calendar

Find my up-to-date schedule in my calendar, *click here*.

Current members of our group

associated post-doctoral researchers:

Wasilij Barsukow (Max Planck Institut for Plasma Physics, Garching)
the Active Flux numerical method for the multi-dim. compressible Euler equations

Simon Markfelder (Cambridge University, Great Britain)
convex integration for multi-dim. compressible Euler equations

post-doctoral researcher:

Marlies Pirner kinetic modeling of dilute gases and its mathematical theory

doctoral students:

Claudius Birke joint project with *Fritz Röpke (Heidelberg)*, numerics of ideal MHD, low Mach, well-balanced, astrophysical applications

Kathrin Hellmuth kinetic equations and their inverse problems

Eva Horlebein theory of multi-dim. compressible Euler equations

Farah Kanbar well-balanced & AP methods for kinetic and compressible flow equations

Sandra Warnecke numerics for multi-species kinetic equations

Lena Baumann numerics for kinetic equations and their inverse problems: combining low rank numerical methods with penalization methods

students working on their Master thesis:

Theresa Full applying the semi-Lagrange method to the Vlasov equations
Vanessa Halat modeling traffic flow via conservation laws with non-local flux
Jonas Jackwirth Korteweg de Vries equation
Claudia Knorr a numerical parameter study with Röpke's astrophysics code
Sonja Leicht solving the elasticity equations using CLAWPACK
Julian Meusel Einstein equations, Anti de-Sitter space time, numerics
Kai Ulrich a numerical low rank algorithm for solving kinetic equations
Yu-Chen Cheng combining central schemes with well-balancing
Kaja Jurak Bayesian methods in applications
Nicole Dannenberg topic to be determined

students working on their Bachelor thesis:

Jonas Dornbusch traffic flow models
Veronika Mayerhofer simulating Tsunami waves using CLAWPACK
Johannes Rieger stochastic modeling in financial mathematics
Moritz Mathy deriving interest rate modles using risk neutral measures
Marvin Raab Lévy models in financial mathematics
Eva Toussaint machine learning methods

Kathrin Hellmuth submitted an article

Kathrin submitted the article *Kathrin Hellmuth, Christian Klingenberg, Qin Li, Min Tang: "Multiscale convergence of the inverse problem for chemotaxis in the Bayesian setting", submitted (2021)*.

This is a piece of analysis, relating a kinetic problem (chemotaxis) with its corresponding macroscopic problem (Keller-Segel). The inverse problems for these two problems are considered. In the Bayesian sense one can show that one inverse problem converges to the other.

The red terms are determined by inverse problems.

$$\frac{\partial}{\partial t} f(x,t,v) + v \cdot \nabla_x f(x,t,v) = \int_V K(x,t,v,v') f(x,t,v') - K(x,t,v',v) f(x,t,v) dv'$$

kinetic chemotaxis equations

$$\frac{\partial}{\partial t}\rho - \nabla \cdot (D(K) \cdot \nabla \rho) + \nabla \cdot (\rho \Gamma(K)) = 0$$

macroscopic Keller-Segel equations

Kinetic Fall School this week

The fall school *Kinetic & Mean Field Problems: Theory, Numerics and Applications* can be accessed through the following links:

Monday 25th October 2021:
https://meet.google.com/ujp-cnxt-okq
Tuesday 26th October 2021:
https://meet.google.com/bbq-ztia-rjf
Wednesday 27th October 2021:
https://meet.google.com/fyp-xfbe-rej
Thursday 28th October 2021:
https://meet.google.com/azf-isyz-zvf

I would use the Google Chrome browser.

Upcoming scientific conferences

Go ahead and click the links to check where you might want to participate.

2021:

- Oct. 25 - 28, 2021: *Kinetic & Mean Field Problems: Theory, Numerics and Applications*, online Fall School, co-organized by Lorenzo Pareschi

- Nov.. 8 - 12, 2021: *Convex Integration and Nonlinear Partial Differential Equations*, a hybrid workshop organized among others by Gui-Qiang Chen and László Székelyhidi

2022:

- Jan. 10 - 14, 2022: *Workshop on tissue growth and movement*, at the Poincaré Institute in Paris, co-organized by Perthame

- Jan. 10 - June 24, 2022: *Frontiers in kinetic theory: connecting microscopic to macroscopic scales - KineCon 2022* , a one semester program organized at the Newton Institute at Cambridge University with 5 one week workshops in this time

- Feb. 14 - 18: *Rigorous analysis of incompressible fluid models and turbulence* organized among others by Anna Mazzukato and Edriss Titi

- March 7 - 11, 2022: *Perspectives on Multiphase Fluid Dynamics, Continuum Mechanics and Hyperbolic Balance Laws* in Luminy near Marseille, France, organized among others by Dumbser and Warnecke

- March 14 - 18, 2022: *SIAM Conference on Analysis of Partial Differential Equations* ***online***, organized by Sid Mishra and Emil Wiedemann

- May 16 - 20, 2022: *The Boltzmann Equations: in the trail of Torsten Carlemann*, near Stockholm, Sweden

- April 4 - 8, 2022: *HIGH ORDER NONLINEAR NUMERICAL METHODS FOR EVOLUTIONARY PDEs: THEORY AND APPLICATIONS (HONOM)* in Braga, Portugal, organized by Raphael Loubère und Stephane Clain

- April 10 - 15, 2022: *Structure preserving discretizations*, in Oberwolfach, organized by Bruno Despres, Michael Dumbser, myself

- May 25 - 29, 2022: *Sharing Higher-order Advanced Research Know-how on Finite Volume (SHARK-FV)* in Portugal, organized by Raphael Loubère und Stephane Clain

- June 20 - 25: HYP2022: *18th International Conference on Hyperbolic Problems, Theory, Numerics, Applications* - Part 2 (formerly HYP 2020), in Malaga, Spain, organized by Carlos Pares

- June 27 - July 1, 2022: *Hyperbolic balance laws & beyond*, in Magdeburg, organized by Helzel and Lukacova

- July 18 - 22, 2022: *When Kinetic Theory meets Fluid Mechanics*, in Zürich, organized among others by Alexis Vasseur

- Aug. 22 - 26, 2022: *10th International Conference on Numerical Methods for Multi-Material Fluid Flow (MULTIMAT 2021)* in Zürich, organized by Remi Abgrall and others

- Sept. 12 - 14, 2022: *Nils Henrik Risebro birthday conference* in Oslo, organized among others by Fjordholm, Holden, Mishra