

NEWSLETTER

of the Work Group Mathematical Fluid Mechanics

Third newsletter

In this newsletter among other things on page 2 you will find a list of the members of our working group.

Christian Klingenberg

Eduard Feireisl will visit us Oct. 20 - 21

Eduard Feireisl will come to Würzburg for Simon's defense. He will stay a day longer for discussions.

a recent birthday:

October 15: Wasilij Barsukow

Happy Birthday

my schedule this week:

Oktober	
18 So	
19 Mo	visit Fritz Röpke in Heidelberg 43
20 Di	2 pm: Simon's defense
21 Mi	
22 Do	
23 Fr	
24 Sa	

←--Feireisl-->
visit



Simon Markfelder's defense on Oct. 20

On Tuesday, Oct. 20 Simon Markfelder will defend his PhD thesis titled "Convex integration applied to the multi-dimensional compressible Euler equations", [click here](#).

For his PhD work he succeeded in finding a *compressible* analogue of the convex integration theory of De Lellis and Székelyhidi for the incompressible Euler system. This had not been achieved before. Form this a number of his previously published theorems can be deduced.

Simon's first post-doc position will be at Cambridge University (England) with [Edriss Titi](#). He will begin to work there in November.

Best paper award

The *International Consortium of Chinese Mathematicians* has awarded the 2020 best paper award to

Klingenberg, C., Schnücke, G., Xia, Y.: "Arbitrary Lagrangian-Eulerian discontinuous Galerkin method for conservation laws: analysis and application in one dimension, Mathematics of Computations, Vol. 86, pp. 1203-1232, (2017) [view PDF](#). [Yinhua Xia](#) had been visiting scientist in Würzburg in 2015/16 during the PhD of [Gero Schnücke](#).

two papers submitted this past week

Hubert Baty, Florence Drui, Emmanuel Franck, Philippe Helluy, Christian Klingenberg, Lukas Tannhäuser:
"A kinetic method for solving the MHD equations. Application to the computation of tilt instability on uniform fine meshes", submitted to *Springer Book Series in Engineering: Current Trends in Fluid Dynamics, Modelling and Simulations*, ed. Zeidan, Zhang, Goncalves Da Silva, Merker (2020)
[view PDF](#)

This paper arose from a project we had with Philippe Helluy (Strasbourg). Lukas Tannhäuser's master thesis was part of this project. This numerical method is extremely efficient.

Wasilij Barsukow, Jonas P. Berberich: *"A well-balanced Active Flux scheme for the shallow water equations with wetting and drying"*, submitted

This paper is a third order numerical method to solve the 1-d shallow water equations. It pays special attention to distinguish between wet and dry states. Its significance is that the Active Flux scheme has been extended to a non-linear equation. [Click here](#) for a nice simulation.

Current members of our group:

associated post-doctoral researcher:

Wasilij Barsukow (Zürich)

structure preserving numerical methods for multi-dim. compressible Euler equations

post-doctoral researcher:

Marlies Pirner

modeling and theory of kinetic equations

doctoral students:

Simon Markfelder

convex integration for multi-dim. compressible Euler equations

Jonas Berberich

joint project with Fritz Röpke (Heidelberg), well-balanced schemes for Euler and MHD with gravity

Farah Kanbar

stationary- and asymptotic-preserving numerical methods, kinetic and compressible flow equations

Sandra Warnecke

numerics for multi-species kinetic equations

Claudius Birke

joint project with Fritz Röpke (Heidelberg), ideal MHD, low Mach, well-balanced, astrophysical applications

Eva Horlebein

theory of multi-dim. compressible Euler equations

Kathrin Hellmuth

inverse problems and uncertainty quantification

Andrea Thomann

(jointly with Gabriella Puppo, Italy) relaxation methods for low Mach number flows

Marc Herrmann

(jointly with Stephan Schmidt) shape optimization

Jayesh Badwaik

(moving mesh method in two space dimensions for the Euler equations, uncertainty quantification for conservation laws)

students working on their Master thesis:

Mattis Vogelsang

numerische Methoden für MHD

Jonas Jackwirth

Korteweg de Vries equation

Winnie Hartwig

Jean-Luc Guermond invariance preserving schemes

Julian Meusel

Einstein equations written as a hyperbolic system, numerical implementation

Lena Baumann

Vlasov Gleichung

Claudia Knorr

numerische Experimente mit einem Astrophysik-code

students working on their Bachelor thesis:

Michael Rimmel

well-posedness theory for conservation laws via front tracking

Fridolin Popov

ein Modell zur Bewegung von Zellen

Jonas Schlecht

AP Diskretisierung von kinetischen BGK Gleichungen

Johannes Rieger

Theorie von Fluidgleichungen

Lukas Krines

Numerik von stochastischen partiellen Differentialgleichungen