

NEWSLETTER

of the Work Group Mathematical Fluid Mechanics

Newsletter no. 28 (2021)

Paper by Wasilij accepted

The paper [Barsukow, W., Klingenberg, C.: "Exact solution and a truly multi-d Godunov scheme for the acoustic equations", ESAIM: Mathematical Modelling and Numerical Analysis, \(2022\)](#) has been accepted for publication. It took five years (*really*, 5) for this paper to be accepted!

For a long time one thought that a two-dimensional Godunov scheme would work once one knows how to solve the two-dimensional Riemann problem. Even Godunov thought that, as he told me himself. It had not been possible to find an exact solution formula for the 2-d Riemann problem. This paper lays such aspirations to rest, since it shows that a 2-d Godunov solver with an exact 2-d Riemann solver works poorly.

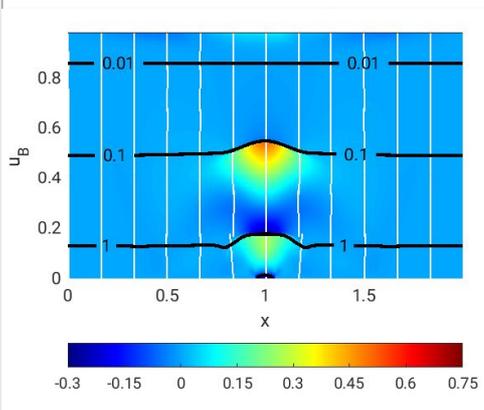
Farah submitted her PhD thesis

Farah Kanbar has submitted her PhD thesis "[Asymptotic and Stationary Preserving Schemes for Kinetic and Hyperbolic Partial Differential Equations](#)".

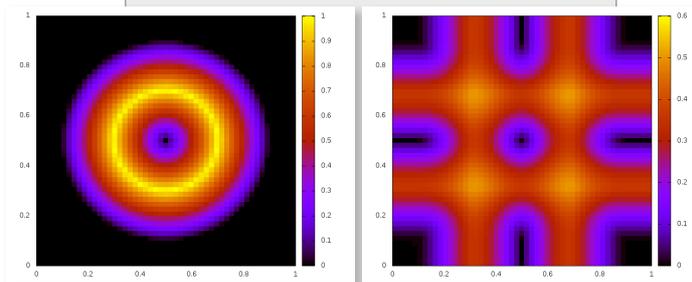
Here is what will happen next:

- two referee reports will be requested,
- once they arrive, these reports together with the thesis will be presented to the faculty of mathematics and computer science for approval,
- if they approve, Farah's defense will be held.

If all goes well, Farah will be finished early in spring 2022.



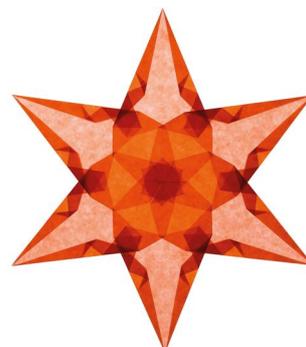
A simulation (from Farah's thesis) of a coronal mass ejection, where the surface of the sun is horizontal at the bottom, and the magnetic field is perpendicular to that. Here the equations of 2-d MHD with gravity are solved by a well-balanced scheme. The component of the velocity field parallel to the magnetic field is shown. The error in $\text{div } B$ is less than 10^{-12} .



A Gresho vortex for the linearized Euler equations: the initial data on the left and the solution of the multi-dimensional Godunov solver on the right - the solution is lousy!

Merry Christmas

Merry Christmas and a Happy New Year to all of you!



A summer school “Numerical methods for kinetic equations”

June 19 - 24, 2022 Eric Sonnendrücker and Lukas Einkemmer will teach a summer school in Toblach, Italy called [“Numerical methods for kinetic equations”](#).



Toblach in the Dolomites

Jonas Dornbusch submitted his Bachelor thesis

Jonas Dornbusch submitted his Bachelor thesis “Solving the Aw-Rascle Traffic Model with Finite Volume Methods and Relaxation”.

Birthday

Lena Baumann’s birthday was in December - congratulations!

Kai Ulrich became a father

In December a daughter named Zoe was born to Kai Ulrich and his wife. All three members of the young family are doing well.

My calendar

See my calendar on the right with Perthame’s [Workshop on tissue growth and movement](#) in the second week of January. Kathrin Hellmuth also plans to attend. Hopefully Corona will not force a change of travel plans ...

Newsletter no. 28 (2021) (two pages)

Upcoming scientific conferences

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

- 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
- Mar. 7 - 9, 2022: [Workshop on inverse problems in biology](#), at the Poincaré Institute in Paris, co-organized by Marie Doumic
- 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 Després, Michael Dumbser, myself
- May 23 - 29, 2022: [Sharing Higher-order Advanced Research Knowledge on Finite Volume \(SHARK-FV\)](#) in Portugal, organized by Raphael Loubère und Stephane Clain
- June 12 - 18, 2022: [Summer School on “Methods and models of kinetic theory”](#) organized by Marzia Bisi (Parma) among others
- 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 19 - 24, 2022 [“Numerical methods for kinetic equations”](#) a summer school by Eric Sonnendrücker and Lukas Einkemmer in the alps in Italy
- 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

Januar	
2022	
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an excerpt from
[my calendar](#)