

NEWSLETTER

of the Work Group Mathematical Fluid Mechanics

Newsletter no. 11 (2022)

Paper submitted by Kathrin Hellmuth

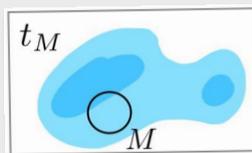
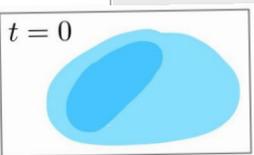
Kathrin Hellmuth submitted the paper [Kathrin Hellmuth, Christian Klingenberg, Qin Li, Min Tang: "Kinetic chemotaxis tumbling kernel determined from macroscopic quantities" \(2022\)](#).

For a kinetic equation, describing chemotaxis,

$$\frac{\partial}{\partial t} f(x, t, v) + v \cdot \nabla_x f(x, t, v) = \mathcal{L}(f)(x, t, v) - \sigma(x, v) f(x, t, v)$$

$$f(x, t = 0, v) = \phi(x, v)$$

the collision kernel (\mathcal{L} and σ) is determined in this paper from measured macroscopic data. One needs to design the measurements appropriately (see picture), in order to prove that one can solve this inverse problem. An introduction to this can be found [here](#).



The measurements: bacteria are placed on a plate at time $t = 0$ (left picture), then they run for some time until at time t_M (right picture). The measurement M is taken by counting all bacteria inside the circle. Darker blue stands for a higher bacteria density.

Upcoming conferences and summer schools attended by us

June 19 - 25 the [Conference on Hyperbolic Problems](#) in Malaga, Spain will be attended by [Marlies Pirner](#), [Claudius Birke](#), [Kathrin Hellmuth](#) and myself. We will all contribute 15 minute oral [presentations](#). This conference has a long tradition (it began in 1986). I co-organized this conference in 2016.

During the same week a [Summer School](#) in the Italian Alps taught by Eric Sonnendrücker and Lukas Einkemmer will be attended by [Lena Baumann](#). She will present a poster there.



the wonderful Dolomites in the Italian alps, where the summer school will take place

News from China

China works on becoming a world leader in science. To this end they recruit top scientists to China (they recruited [Shi Jin](#)) and support their research generously. His well funded [institute](#) in Shanghai ([Min Tang](#) is a professor there) unites mathematicians with natural scientists from other disciplines.

More recently he was asked to head a new [Shanghai Jiao Tong University Chongqing Artificial Intelligence Institute](#) that will be established in a large new 9 story building.

Also have a look at Shi Jin's new [review article](#) on asymptotic preserving methods.



Shi Jin

Andrea Thomann was offered a permanent position in France



Andrea Thomann, who did her PhD with us in Würzburg and Gabriella Puppo in Italy (Andrea finished in 2020) on AP schemes, has been offered a permanent INRIA researcher position in France. These are research positions at the interface of the university and industries needing computation. It has yet to be decided where she will go, but probably to Straßburg (in *Philippe Helluy's* group).

Workshop on UQ for kinetic equations in Vienna

Currently in Vienna there is a thematic program on *Computational Uncertainty Quantification*. This week there will be a workshop on *Uncertainty quantification for kinetic and transport equations* with interesting lectures (among others by Shi Jin, *Qin Li* and *Li Wang*).

You will be able to find recordings of the lectures [here](#) (go to "Schedule" and scroll down).

Upcoming scientific conferences

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

- 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
- June 12 - 18, 2022: [Summer School on "Methods and models of kinetic theory"](#) organized by Marzia Bisi (Parma) among others
- June 19 - 24, 2022 ["Numerical methods for kinetic equations"](#) a *summer school* by Eric Sonnendrücker and Lukas Einkemmer in the alps in Italy
- June 20 - 25: HYP2022: [18th International Conference on Hyperbolic Problems, Theory, Numerics, Applications](#) - (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
- July 25 - 29, 2022: [2nd IST Austrian Summer School in Analysis and PDEs](#), with Felix Otto and László Székelyhidi as lecturers
- 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
- Sept. 26 - 30, 2022: [Horizons in non-linear PDEs](#), a *summer school* in Ulm, organized by Emil Wiedemann and others
- Oct. 9 - 14, 2022: [Computation of hyperbolic and related PDEs: A conference in honor of Remi Abgrall](#), organized by Sid Mishra at ETH Zurich on Monte Verità (Ascona, Switzerland)
- Sept. 19 - 23, 2022: [12th European Conference on Mathematical and Theoretical Biology](#) in Heidelberg, organized by Anna Marciniak (Heidelberg) and others
- Nov. 7 - 10, 2022: "Numerical Methods for the Kinetic Equations of Plasma Physics" (NumKin 2022) in Garching (near Munich), organized by Eric Sonnendrücker
- Nov. 14 - 18, 2022: [Research School on Kinetic Theory](#), in Luminy (near Marseille, France), organized by José Carillo, Markus Schmittchen and others
- March 29 - 31, 2023: [4th European conference on Non-equilibrium gas flows](#) to be held in Eindhoven, Netherlands