TECHNISCHE UNIVERSITÄT DRESDEN

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Sommersemester 2022

Dresdner Mathematisches Seminar

Prof. Dr. Marco Di Francesco
Università degli Studi dell'Aquila (I), Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica (DISIM)

On the "follow-the-leader" approximation of one-dimensional nonlinear transport equations

Partial Differential Equations (PDEs) of "transport" type are omnipresent across the sciences: from physics, biology, social sciences, to artificial intelligence, machine learning, and complex systems.

Approximating a solution to a transport PDE by a set of "moving particles" has several advantages. It validates the use of a continuity equation in an "individuals-based" modelling setting, it provides a link between Lagrangian and Eulerian description, and it defines a "natural" numerical approach to those equations. I will describe recent rigorous results in that context. The main one deals with one-dimensional scalar conservation laws with nonnegative initial data, for which we prove that a suitably designed "follow-the-leader" particle scheme approximates entropy solutions in the sense of Kruzkov in the many particles limit. Said result represents a new way to solve scalar conservation laws with bounded and integrable initial data. The same method applies to second order traffic flow models, to nonlocal transport equations, and to the Hughes model for pedestrian movements.

Mittwoch, 22.06.2022, 17:00 Uhr – Willers-Bau, Raum C 129

Leitung: Jun.-Prof. Dr. Markus Schmidtchen

Vor dem Vortrag findet **ab 16:30 Uhr** ein gemeinsames **Kaffee-/Teetrinken** vor Hörsaal **WIL C 307 (!)** statt.

Bereich Mathematik und Naturwissenschaften
Fakultät Mathematik