

Perspectives in Applied PDEs: a day in Pavia

Pavia, February 9, 2016

Scientific Program

2.25-2.30 pm	Opening
2.30-3.10 pm	Arghir Zarnescu, <i>Around liquid crystal inertia within the Q-tensor framework</i>
3.15-4.55 pm	Yoshihiro Ueda, <i>Stability condition for a system of delay-differential equations and its application</i>
4.00-4.30 pm	Coffee Break
4.30-5.10 pm	Takeshi Fukao, <i>Degenerate parabolic equations with dynamic boundary condition</i>
5.15-5.55 pm	Eduard Feireisl, <i>Measure-valued solutions to compressible fluid flows revisited</i>

Abstracts

Eduard Feireisl, *Measure-valued solutions to compressible fluid flows revisited*

We introduce a concept of dissipative measure-valued solution to the Euler/Navier-Stokes system describing the motion of a compressible inviscid/viscous fluid. We show that a measure-valued and classical solutions starting from the same initial data coincide as long as the latter exists (weak-strong uniqueness). Several applications of this result will be given including convergence of certain numerical schemes.

Takeshi Fukao, *Degenerate parabolic equations with dynamic boundary condition*

This study is based on the recent joint works with P. Colli (Pavia, Italy). In this talk, the well-posedness of degenerate parabolic equations with dynamic boundary condition is discussed. The essential idea is to characterize the target degenerate parabolic equations as the asymptotic limit of Cahn-Hilliard systems. This system has a structure of the total mass conservation, namely the volume in the bulk plus the boundary. Based on the result by Colli-Fukao (2015), the approximate problem of Cahn-Hilliard systems can be solved with suitable uniform estimates.

Yoshihiro Ueda, *Stability condition for a system of delay-differential equations and its application*

In this talk, we discuss a system of delay-differential equations (DDEs). For a single equation of DDEs, we had already known the stability condition to obtain the asymptotic stability result. On the other hand, we have few results of the stability condition for a system of DDEs. Under this situation, we derive some stability condition for the system of DDEs and apply this result to the system of PDEs with delay terms. This talk is based on a joint work with Gilbert R. Peralta (University of the Philippines Baguio).

Arghir Zarnescu, *Around liquid crystal inertia within the Q-tensor framework*

One of the most intriguing aspects of liquid crystals, from both a physical and mathematical point of view concerns the presence of inertia, manifested as a second-order material derivative. Usually, based on physical considerations, the inertia is considered to be negligible and dropped from the equations, which conveniently simplifies the equations significantly. We consider one of the simplest cases in which the inertia is kept, within the Qian-Sheng formalism, and provide a basic well-posedness result. We further consider some simple instances of a mysterious type of solution the Ericksen twist waves. This is joint work with Francesco de Anna (Bordeaux).