Journées d'analyse non-linéaire
Nov. 24&25, 2011, Besançon

Thursday, Nov. 24	Friday, Nov. 25.
8h30– 9h10 Guy Vallet 9h10– 9h50 Michel Pierre	9h10– 9h50 Petra Wittbold
coffee break	coffee break
10h20–11h00 Alessio Porretta 11h00–11h40 Noureddine Igbida	10h20–11h00 Kenneth H. Karlsen 11h00–11h40 Christian Rohde
lunch	lunch
13h30–14h10 Bruno Saussereau 14h10–14h50 Nathaël Alibaud	13h00–13h40 Matthieu Brassart 13h40–14h20 Etienne Emmrich
discussions, festivities 21h light dinner at *Brasserie de Commerce*	coffee, discussions, departures

N. Alibaud	*Continuous dependence estimates for nonlinear fractional convection-diffusion equations*
M. Brassart	*About the uniqueness of entropy solutions for a non local problem*
E. Emmrich	*Nonlinear evolution equations of second order in time: existence of solutions and convergence of full discretization*
N. Igbida	*The Monge-Kantorovich equation and sandpile problem*
K.H. Karlsen	*The Degasperis-Procesi equation*
M. Pierre	*An amazing L^2-estimate in reaction-diffusion systems: four applications*
A. Porretta	*Parabolic capacity and equations with measure data*
Ch. Rohde	*Numerical Solution of Compressible Phase Transition Problems by a Multi-Scale Approach*
B. Saussereau	*Scalar conservation laws with fractional stochastic forcing: existence, uniqueness and invariant measure*
G. Vallet	*On some Barenblatt's problems*
P. Wittbold	*On stochastic conservation laws.*

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Abstracts

Nathaël Alibaud (Besançon) *Continuous dependence estimates for nonlinear fractional convection-diffusion equations*

We derive continuous dependence estimates for convection-diffusion equations with nonlocal, nonlinear, and possibly degenerate diffusion terms. The equations are nonlocal because they involve diffusion operators that are generators of pure jump Lévy processes (e.g. the fractional Laplacian). This is a joint work with Simone Cifani and Espen R. Jakobsen.

Matthieu Brassart (Besançon) *About the uniqueness of entropy solutions for a non local problem*

In this joint work with N.Alibaud, a conservation law in divergence form is perturbed by a fractionnal power (p) of the Dirichlet laplacian. For hyperbolic regimes ($p < 1/2$) in bounded domains, we extend the notion of entropy solutions initiated in $\mathbb{R}^d$ and try to prove their uniqueness by Kruzkov's doubling variable method. Specific problems due to the boundary arise, which seem to be solved by some non standard spectral estimates on the (local) Dirichlet laplacian.

Etienne Emmrich (Bielefeld) *Nonlinear evolution equations of second order in time: existence of solutions and convergence of full discretization*

Nonlinear evolution equations of second order in time often arise in solid and quantum mechanics. We consider several classes of such equations incorporating damping terms. The existence of generalized solutions follows from the convergence of a sequence of approximate solutions. For the approximation, a suitable time discretization method combined with an internal approximation scheme can be employed. Depending on the structure of the equation and the type of nonlinearities, different functional analytic approaches (monotone operators, strongly continuous perturbations, convex and non-convex potentials, ...) are the basic ingredients.

Noureddine Igbida (Limoges) *The Monge-Kantorovich equation and sandpile problem*

In this talk, we study existence and uniqueness of a solution for the so called Monge-Kantorovich evolution equation. This equation appears in the study of the sandpile and the associated stationary equation appears in the study of Monge problem for optimal mass transportation. We will also present some numerical results.

Kenneth H. Karlsen (Oslo) *The Degasperis-Procesi equation*

We will discuss work on the well-posedness and numerical analysis of the Degasperis-Procesi equation in classes of (discontinuous) entropy solutions. Our focus on discontinuous solutions contrasts notably with the existing literature on the Degasperis-Procesi equation, which emphasizes similarities with the CamassaHolm equation (bi-Hamiltonian structure, integrability, peakon solutions and H^1 as the relevant functional space).

Michel Pierre (Rennes) *An amazing L^2-estimate in reaction-diffusion systems: four applications*

Alessio Porretta (Rome) *Parabolic capacity and equations with measure data*

I will describe a joint work with F. Petitta and A.C. Ponce, where we discuss some properties of representation of time-space measures not charging sets of null p-capacity (the capacity defined from the p-laplace parabolic operator) and we prove existence and uniqueness of solutions to problems with absorption and such measures as data. Our approach is linked to estimates on the capacity of level sets and a refinement of the notion of renormalized solution for parabolic equations.

Christian Rohde (Stuttgart) *Numerical Solution of Compressible Phase Transition Problems by a Multi-Scale Approach*

Bruno Saussereau (Besançon) *Scalar conservation laws with fractional stochastic forcing: existence, uniqueness and invariant measure*

We study a fractional stochastic perturbation of a first order hyperbolic equation of nonlinear type. Existence and uniqueness of the solution is investigated via a Lax-Oleinik formula. To construct the invariant measure we mainly us two ingredients. The first one is the notion of generalized characteristic in the sense of Dafermos. The second one is the fact that the oscillations of the fractional Brownian motion are arbitrarily small for an infinite number of intervals of arbitrary length.

Guy Vallet (Pau) *On some Barenblatt's problems*

In this talk, we will be interested in a nonlinear parabolic and pseudoparabolic problems of Barenblatt's type (the prototype equation is: $f(\partial_t u) - \Delta u = g$).

Petra Wittbold (Essen) *On stochastic conservation laws*

In this talk, we are interested in the formal stochastic nonlinear conservation law of type: $du - \text{div}(f(u))\,dt = h(u)dw$ in $\Omega \times \mathbb{R}^d \times (0,T)$, with an initial condition u_0 in $L^2(\mathbb{R}^d)$ and $d \geq 1$. After a brief reminder on conservation laws and stochastic problems, we propose to prove the existence and the uniqueness of the entropy solution. The result is based on Kruzhkov's doubling-variable method and the convergence in the sense of Young measures.