Titles and Abstracts

Stability for chains of solitons for the Landau-Lifshitz equation

Philippe Gravejat (École Polytechnique)

Abstract: In this talk, we present several results related to the Landau-Lifshitz equation with an easy-plane anisotropy. In particular, we focus on the orbital stability of well-prepared chains of solitons in the one-dimensional setting.

On the global Cauchy problem for non-linear Schrödinger equation with magnetic potential

Nabile Boussaid (Université de Franche-Comté)

Abstract: We study the Cauchy problem for the non-linear Schrödinger equation with time depending magnetic field in $\mathbb{R}^N$.

For power-like non linearities and possibly unbounded magnetic potential we prove existence and uniqueness of solutions in the energy space.

Optimal convergence rates for the parabolic-elliptic Keller-Segel model in the subcritical regime

Jean Dolbeault (Université Paris-Dauphine)

Abstract: The Keller-Segel model describes aggregation phenomena of amoebae in biology and is used more generally for the description of collective behaviors. It has the peculiarity that a simple parameter, the mass, allows to distinguish a diffusion dominated regime from another, super-critical one in which finite time blow-up occurs. In the sub-critical regime, solutions develop a self-similar behavior for large times which can be described accurately with an appropriate linearization of the model. Better, optimal convergence rates towards the self-similar regime can be established using a relative entropy (free energy) functional. The talk will be mostly devoted to results obtained with J. Campos.

Existence and conditional energetic stability of solitary gravity-capillary water waves with constant vorticity

Mark Groves (Universität des Saarlandes)

Abstract: We present an existence and stability theory for gravity-capillary solitary waves with constant vorticity on the surface of a body of water of finite depth. Exploiting a classical variational principle, we prove the existence of a minimizer of the wave energy $\mathcal{E}$ subject to the constraint $\mathcal{I} = 2\mu$, where $\mathcal{I}$ is the wave momentum and $0 < \mu \ll 1$. Since $\mathcal{E}$ and $\mathcal{I}$ are both conserved quantities a standard argument asserts the stability of the set D_μ of minimizers: solutions starting near D_μ remain close to D_μ in a suitably defined energy space over their interval of existence. In the applied mathematics literature solitary water waves of the present kind are modeled as solutions of the long-wave equations of KdV or NLS type. We show that the waves detected by our variational method converge (after an appropriate rescaling) to solutions of the appropriate model equation as $\mu \downarrow 0$.

Finite-time blowup and global existence for the complex Ginzburg-Landau equation

Thierry Cazenave (Université Pierre et Marie Curie)

Abstract: In this talk, I will discuss recent joint works with Flávio Dickstein (UFRJ) and Fred B. Weissler (Paris-Nord) on the complex Ginzburg-Landau equation

$$\partial_t u = e^{i\theta}\Delta u + e^{i\phi}|u|^\alpha u,$$

set either on the whole space, or on the torus (i.e., with periodic boundary conditions), or on a bounded domain with Dirichlet boundary conditions. Here $-\frac{\pi}{2} \le \theta, \gamma \le \frac{\pi}{2}$ and $\alpha > 0$. In the case $\theta = \gamma$, we prove finite-time blowup under a standard energy condition on the initial value and study how the blowup time depends on θ. In the more general case $\phi \neq \theta$, we prove the existence of standing waves on the torus, for sufficiently small α. I will also comment several open questions that naturally arise.