la RECHERCHE à l'Université

11es journées scientifiques

Tuesday April 25th
14:00 - 18:00
Wednesday April 26th
10:20 - 12:20
Salle CO.701

Dynamics and modeling of complex networks

Modélisation et dynamique des réseaux complexes

- Pôle Mer, Environnement et Développement Durable
- Pôle Information, Numérique, Prévention

Campus de Toulon
Porte d'Italie

UNIVERSITÉ DE TOULON

Speakers

Pedro CARO (Basque Center for Applied Mathematics, Bilbao)

Mehmet ERSOY (Universite de Toulon)

Yavar KIAN (Aix-Marseille Universite)

François NICOLEAU (Universite de Nantes)

Lauri OKSANEN (University College London)

Schedule

14:00 *Pedro CARO*

The Calderon problem with corrupted data

15:00 *Mehmet ERSOY*

Un schema cinetique pour un probleme d'entrainement d'air

16:00 Cofee break

16:20 *François NICOLEAU*

On the hidden mechanism behind non-uniqueness for the anisotropic Calderon problem with data on disjoint sets

20:00 Dinner

Schedule

09:30 *Yavar KIAN*

Inverse and direct problems for fractional diusion equations

10:30 Cofee break

10:50 *Lauri OKSANEN*

Recovery of a time-dependent potential in a wave equation on a Riemannian manifold

Abstracts

Pedro CARO

The Calderón problem with corrupted data

Abstract : The inverse Calderón problem consisting of determining the conductivity inside a medium by electrical measurements on its surface. Ideally, these measurements determine the Dirichlet-to-Neumann map and, therefore, one usually assumes the data to be given by such map. This situation corresponds to having access to infinite-precision measurements, which is totally unrealistic. In this talk, we will discuss the CalderÛn problem assuming the data to contain measurement errors. Its goal will be to provide formulas to reconstruct the conductivity and its normal derivative on the surface. Finally, I will state the rate convergence of the method.

Mehmet ERSOY

Un schéma cinétique pour un problème d ?entrainement d ?air

Abstract : Dans cet exposé, on construit un modèle à deux couches pour traiter les problèmes d ?entrainements d ?airs/eau. Ce dernier forme un système á 4 équations aux dérivées partielles conditionnellement hyperbolique pour lequel la plupart des méthodes numériques Volumes Finis échouent. On propose alors une interprétation cinétique afin de construire un schéma numérique robuste. On montre notamment quelques propriétés intéressantes du schéma avec pour illustrations quelques cas tests numériques.

Abstracts

Yavar KIAN

Inverse and direct problems for fractional diffusion equations

Abstract : Let Ω be a bounded domain of $\mathbb{R}^n$, $n \geq 2$, and fix $Q = (0,T) \times \Omega$ with $T > 0$. For $\alpha \in \mathcal{C}(\overline{\Omega})$ we consider fractional diffusion equations of the form $\rho(x)\partial_t^{\alpha(x)} u - \mathrm{div}_x(a(x)\nabla_x u) + q(x)u = 0$ for $(t,x) \in Q$, with $\partial_t^{\alpha(x)}$ the fractional derivative of order $\alpha(x)$ in the Caputo sense. We start by assuming that $\alpha \in (0,1) \cup (1,2)$ is constant. In that case, we consider the problem of determining the weight ρ, the conductivity a and the potential q from observations of solutions on $\partial\Omega$. Then, we assume that $a = 1$ and $\alpha \in \mathcal{C}(\overline{\Omega})$ satisfies $0 < \alpha_0 \leq \alpha \leq \alpha_M < 1$. In that case we consider both the forward problem and the inverse problem of determining the weight ρ, the fractional variable power α and the potential q from observations of solutions on $\partial\Omega$. These results are based on joint works with Lauri Oksanen, Eric Soccorsi and Masahiro Yamamoto.

François NICOLEAU

On the hidden mechanism behind non-uniqueness for the anisotropic Calderón problem with data on disjoint sets

Abstract : We show that there is generically non-uniqueness for the anisotropic Calderón problem at fixed frequency when the Dirichlet and Neumann data are measured on disjoint sets of the boundary of a given domain. More precisely, we first show that given a smooth compact connected Riemannian manifold with boundary (M,g) of dimension $n \geq 3$, there exist in the conformal class of g an infinite number of Riemannian metrics $\tilde{g}$ such that their corresponding DN maps at a fixed frequency coincide when the Dirichlet data Γ_D and Neumann data Γ_N are measured on disjoint sets and satisfy $\overline{\Gamma_D \cup \Gamma_N} \neq \partial M$. The conformal factors that lead to these non-uniqueness results for the anisotropic Calderón problem satisfy a nonlinear elliptic PDE of Yamabe type on the original manifold (M,g) and are associated to a natural but subtle gauge invariance of the anisotropic Calderón problem with data on disjoint sets. We then construct a large class of counterexamples to uniqueness in dimension $n \geq 3$ to the anisotropic Calderón problem at fixed frequency with data on disjoint sets and *modulo this gauge invariance*. This class consists in cylindrical Riemannian manifolds with boundary having two ends (meaning that the boundary has two connected components), equipped with a suitably chosen warped product metric. This is a joint with work with Thierry Daudé and Niky Kamran.

Abstracts

Lauri OKSANEN

Recovery of a time-dependent potential in a wave equation on a Riemannian manifold

Abstract : We consider the Cauchy data set associated to a wave equation on a simple Riemannian manifold with boundary, and show that the Cauchy data set determines uniquely a time-dependent potential in the wave equation. The talk is based on joint work with Yavar Kian.

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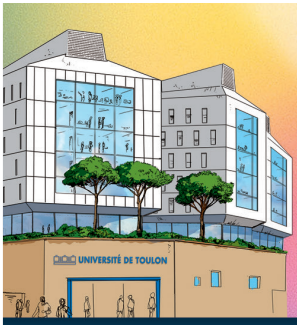

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