

ANR HAB Workshop, Lyon

June 14-16, 2017

Wednesday 14

14:00-15:00: Exact observation of a wave equation in a non-cylindrical domain.

Speaker: Bernhard Haak (University of Bordeaux)

Abstract: We discuss point observations in the interior and the boundary of a 1D wave equation on a time-varying domain. This pleasant subject has interactions with dynamical systems and is based on joint work with (my PhD student) D.T. Hoang.

15:30-16:30: Hölder continuity in time for weak solutions to parabolic systems : A non-local approach

Speaker: Moritz Egert (University Paris Sud)

Abstract: We report on recent results concerning local regularity of weak solutions to parabolic equations (or systems) in divergence form

$$\partial_t u - \operatorname{div}_x A(t, x) \nabla_x u = 0$$

on some parabolic cylinder $I \times Q \subseteq \mathbb{R} \times \mathbb{R}^n$, obtained in collaboration with P. Auscher, S. Bortz, and O. Saari. Coefficients will be complex valued and depend merely measurably on time as well as on all spatial directions.

By the Lions approach to weak solutions it is well known that u is continuous in time valued in spatial $L^2_{\text{loc}}(Q)$. In my talk I will present a general improvement: u is locally Hölder continuous in time valued in spatial $L^p_{\text{loc}}(Q)$

for some $p > 2$. Surprisingly, this will follow from global arguments, relying on a careful study of weak solutions to the inhomogeneous equation on all of \mathbb{R}^{1+n} through their non-local fractional time-derivative $D_t^{1/2}u$.

16:30-17:30: A first order approach to L^p estimates for the Stokes operator on Lipschitz domains

Speaker: Sylvie Monniaux (University Aix-Marseille)

Abstract: In this talk, I will describe a first order approach to developing an L^p theory for the Hodge-Laplacian and the Stokes operator with Hodge boundary conditions, acting on a bounded open subset of \mathbb{R}^n . In particular, conditions on the domain and p under which these operators have bounded resolvents, generate analytic semigroups, have bounded Riesz transforms, or have bounded holomorphic functional calculi will be given. The first order approach of initially investigating the Hodge? Dirac operator, provides a framework for strengthening known results and obtaining new ones on general classes of domains, in what we believe is a straightforward manner.

This is a joint work with Alan McIntosh.

Thursday 15

09:30-10:30: TBA

Speaker: Michel Bonnefont (University of Bordeaux)

Abstract: TBA.

11:00-12:00: Unimodular maps: degree, Jacobian, profile decomposition, structure

Speaker: Petru Mironescu (University of Lyon I)

Abstract: In the theory of Sobolev spaces of maps $u : \mathbb{R}^n \rightarrow \mathbb{S}^k$, $n \geq k$, the critical regularity is $u \in W^{s,p}$ with $sp = k$. At this level of regularity, it is possible to detect the singularities using the distributional Jacobian. We explain how to define this Jacobian, and how it encodes topological properties. The definition relies on the theory of weighted Sobolev spaces, that we will recall. We also explain how such techniques are useful in giving the structure

of the Sobolev spaces when $k = 1$, and the profile decomposition of bounded sequences. We will present applications to nonlocal variational problems and semi-stiff boundary problems.

14:00-15:00: Harmonic measure in higher co-dimension

Speaker: Joseph Feneuil (University of Minnesota)

Abstract: Recent developments in geometric measure theory have shown that harmonic measure plays an important role in geometric measure theory: under some condition of connectedness on $\Omega \subset \mathbb{R}^n$, the boundary $\partial\Omega$ is $n - 1$ -rectifiable if and only if the harmonic measure and the surface measure on $\partial\Omega$ are mutually absolutely continuous. This result is unfortunately limited to the co-dimension 1 case (because harmonic measure can be constructed only on sets with small codimension). To fill this gap, we give a ‘new’ notion of harmonic measure, also associated to an elliptic PDE, on sets $\Gamma \subset \mathbb{R}^n$ of dimension $d < n - 1$. We give then the main steps of the proof of the fact that our harmonic measure is absolutely continuous with respect to the Hausdorff measure on Lipschitz graphs (with small Lipschitz constant), which is the analogue of a result given by Dahlberg in 1986 in the case of the codimension 1.

This is a joint work with Guy David and Svitlana Mayboroda.

15:30-16:30: Rescaled extrapolation and Fourier multipliers in Banach function spaces

Speaker: Alex Amenta (University of Delft)

Abstract: We prove a version of Rubio de Francia’s rescaled extrapolation theorem for functions taking values in a q -convex Banach function space with UMD q -concavification. As an application we prove Littlewood-Paley-Rubio de Francia-type estimates for such functions, and from these we prove Coifman-Rubio de Francia-Semmes-type multiplier theorems for operator-valued Fourier multipliers of bounded s -variation.

Joint work with Emiel Lorist and Mark Veraar (TU Delft)

Friday 16

09:30-10:30: Weighted L^2 -estimate for the Riesz transform on manifolds

Speaker : Kamilia Dahmani (University of Toulouse III)

Abstract: After an overview of some results concerning the Hilbert and the Riesz transforms, we will focus on a weighted L^2 estimate on Riemannian manifolds with non-negative Ricci curvature.

11:00-12:00: TBA

Speaker : Stefanie Petermichl (University of Toulouse III)

Abstract: TBA.