Colloquium del Departamento

de Análisis Matemático

Marina Murillo

Universitat Jaume I (Castellón de la Plana)

"Maximal regularity in lp spaces for fractional lattice models"

Jueves 1 de junio de 2017

a las 13:00 horas en el seminario 222

Abstract:

In this talk, our concern is the analysis of the existence of solutions belonging to the Lebesgue space $l^p(Z;X)$ for the Cauchy problem: $D_t^{\alpha} u(t, x) = Au(t, x) + G(u(t, x))$, $t \in R$, $x \in \Omega \subset R^N$, $\alpha>0$ (1) where A is a closed linear operator, not necessarily bounded, with domain D(A) defined on a Banach space of functions X, and D_t^{α} denotes the forward Liouville derivative. One of the motivations for this study is that (1) models subdiffusion and superdifussion phenomena in case of $A = -\Delta$ the negative Laplacian operator. We focus our attention on the problem of analyzing the existence of solutions in Lebesgue spaces of sequences, for fractional lattice equations, obtained by sampling of differential equations modeled in the form (1).

More precisely, we are concerned with equations of the form $\Delta^{\alpha} u(n, x) = Au(n, x) + G(u(n, x))$, $n \in Z$, $x \in \Omega \subset R^N$, $\alpha>0$ (2). Here the fractional difference operator Δ^{α} comes from the generalized Grünwald–Letnikov derivative. In the linear case, we show a complete characterization solely in terms of R-boundedness of the operator-valued symbol associated to the abstract model. In the nonlinear situation, we prove a useful criteria for existence of lp-solutions based on the implicit function theorem. We introduce the discrete fractional Fisher and Nagumo equations with small external forcing term and we prove the existence of solutions for such equations in the setting of Lebesgue spaces of sequences and in terms of the size of the coupling coefficient.

Departamento de Análisis Matemático