SEMINÁRIO DE EQUAÇÕES DIFERENCIAIS

A study of Abstract Fractional Differential Equations: Global Existence, Comparison and the Critical Case

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Resumo: Motivated by the success of the applications of the fractional differential equations in many areas of science, our objective in this talk is to prove some results about the abstract problem

$$\begin{cases} {}_cD_t^\alpha u(t) = -Au(t) + f(t, u(t)), \ \ t > 0 \\ u(0) = u_0 \in X, \end{cases}$$

where X is a Banach space, $\alpha \in (0,1)$, $A : D(A) \subset X \to X$ is a positive sectorial operator, ${}_cD_t^\alpha$ is the Caputo fractional derivative and the function $f : [0,\infty) \times X \to X$ is suitably chosen.

In fact, we search to answer some questions that were open: for instance, we analyze the existence of local mild solutions for the problem, and its possible continuation to a maximal interval of existence, the case of critical nonlinearities and finally, by establishing some general comparison results, we guarantee the existence of global mild solutions at some situations.

This talk is based on recent works with Alexandre N. Carvalho, Bruno L. de Andrade Santos and Pedro Marin-Rubio.