



## Marduck Montoya Henao

### FRACTIONAL CAUCHY PROBLEMS WITH ALMOST SECTORIAL OPERATORS

#### Abstract

The goal of this seminar is to discuss the needed tools to ensure the existence and uniqueness of some Cauchy problems described by the abstract differential equation:

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

with  ${}_cD_t^\alpha$  denoting the Caputo derivative of order  $\alpha \in (0, 1)$  and  $A: D(A) \subset X \rightarrow X$  an almost sectorial operator.

Note that, as discussed in [1,2], almost sectorial operators have some deficiencies on the estimates of its resolvent operator, and the generated semigroup behaves singularly at  $t = 0$ . This new behavior gives rise to a quite rich discussion about this new class of operators, with together with the fractional derivation theory, justify the study of this problem (see [3] for more details). This work was done under the advisement of Prof. Paulo Carvalho.

#### References:

1. J. M. Arrieta, A. N. Carvalho, G. Lozada-Cruz, Dynamics in dumbbell domains I. Continuity of the set of equilibria, *J. Differential Equations*, 231 (2006) 551–597.
2. J. M. Arrieta, A. N. Carvalho, G. Lozada-Cruz, Dynamics in dumbbell domains II. The limiting problem, *J. Differential Equations*, 247 (2009) 174–202.
3. R-N. Wang, D-H. Chen and T-J. Xiao, Abstract fractional Cauchy problems with almost sectorial operators, *Journal of Differential Equations*, 252 (2012) 202–235.

**Florianópolis. May 24<sup>th</sup>, 2018. 14:00 - 15:00**

**Room 202 - Maths Department**

Check out our website: <http://mtm.ufsc.br/~bortolan/seminario/index1.html>