Analysis Seminar

Fractional Calculus and Differential Equations

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Abstract.

In the recent years, many authors have contributed to the development of fractional calculus and differentials equations. It is worth mentioning that the idea of defining a fractional derivative started with L'Hospital in a letter he sent to G. W. Leibniz. However, only in the last few decades a more intense research has started to be done in this area.

An interesting characteristic of this field of study is that several papers are completely focused on the discussion of how some fractional models are more precise than their respective standard models. One of the main differential equations with this kind of behavior is the reaction-diffusion equation.

The main idea of this lecture is to introduce the most basic concepts of the area and discuss fractional differential equations. To that end, we introduce some special functions, such as the Mittag-Leffler function, the Write-Type function and Mainardi function.

References

[1] E. Bazhiekova, Fractional Evolution Equations in Banach Spaces, Ph.D. Thesis, Eindhoven University of Technology, 2001.

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[3] A. A. Kilbas, H. M. Srivastava and J. J. Trujillo, Theory and Applications of Fractional Differential Equations, Elsevier, Amsterdam, 2006.

[4] F. Mainardi, Fractional Calculus and Waves in linear Viscoelasticity, Imperial College Press, London, 2010.

[5] S. G. Samko, A. A. Kilbas, and O. I. Marichev, Fractional Integrals and Derivatives. Theory and Applications, Gordon & Breach Sci. Publishers, Yverdon, 1993.