CIDMA CENTRO DE I&D EM MATEMÁTICA E APLICAÇÕES
CENTER FOR R&D IN MATHEMATICS AND APPLICATIONS

Seminar
Systems and Control Group - CIDMA

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Departamento de Matemática, Universidade de Aveiro
Sala Sousa Pinto

Existence and stability results for a fractional boundary value problem involving the usual derivative

Anabela Silva
CIDMA, Universidade de Aveiro
anabela.silva@ua.pt

Abstract

Fractional calculus is considered a powerful tool in describing complex systems with a wide range of applicability in many fields of science and engineering. The behavior of many systems can be described by using fractional differential equations with boundary conditions. The theory of stability is an important branch of the qualitative theory of those fractional differential problems. In particular, we highlight the notions of Ulam-Hyers and Ulam-Hyers-Rassias stabilities. It is clear that when facing a system that is stable in the Ulam-Hyers and Ulam-Hyers-Rassias sense, most of the times we do not need to reach exact solutions. This is quite useful in different situations (and in the obvious case when the exact solution is not known).

In this seminar, we investigate a class of boundary value problems involving Caputo fractional derivative and the usual derivative. Based upon Banach contraction principle and Krasnoselskii's fixed point theorem, we prove the existence and uniqueness of solutions for the problem under study and we investigate the Ulam-Hyers and Ulam-Hyers-Rassias stabilities. Besides, we discuss an example for illustrating the theoretical results.

This talk is based on joint work with L. P. Castro.

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