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

Session of seminars organized by

Systems and Control Group

Optimization Graph Theory and Combinatorics Group

28 may 2025, Room 11.2.21, University of Aveiro

3:00 pm

Motion primitives on spherical surfaces with application to Airborne Wind Energy Systems

Sérgio Vinha (SYSTEC-FEUP, Portugal) svinha@fe.up.pt

Abstract: Motion primitives on spherical surfaces provide a structured framework for controlling tethered aircraft in circular trajectories. These are used to address a key challenge in Airborne Wind Energy Systems (AWES): autonomous take-off and landing. Control strategies combining spherical motion planning, roll control via bridle actuation, and robust multivariable controllers are developed. In this talk, I will present these methods and show how they enable smooth, coordinated manoeuvres to improve AWES autonomy and reliability.

3:30 pm

Cauchy problem for a singularly perturbed integral-differential equation

Nuraiym Bukanay (Al-Farabi Kazakh National University, Almaty, Kazakhstan) nbukanay@gmail.com

Abstract: The talk is devoted to the study of an initial problem for a third-order linear integral-differential equation with a small parameter at higher derivatives, provided that the roots of the additional characteristic equation have opposite signs. In this work, a fundamental system of solutions, initial functions for a singularly perturbed homogeneous differential equation are constructed. An analytical formula for the solution for a given singularly perturbed initial integral-differential problem is given. A theorem about asymptotic estimates of the solution is proved.

4:00 pm

Some aspects of optimal control problems with delays

Lela Alkhazishvili (Ivane Javakhishvili Tbilisi State University, FENS, Dep. of Computer Sciences) lela.alkhazishvili@tsu.ge

Abstract: Optimal control problems involving delays are discussed. A mathematical model that incorporates delays in both phase coordinates and control variables is introduced. The Pontryagin Maximum Principle is presented and analyzed in the context of systems with constant and time-varying delays in phase coordinates and controls. Various types of initial conditions are considered, including continuous, discontinuous, and mixed formulations.

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