Seminário OGTC
Optimization, Graph Theory and Combinatorics

9 de dezembro de 2019
(14:30h – 15h30 — Sala Sousa Pinto)

Control problems for singularly perturbed systems with delay
Olga Tsekhan

Yanka Kupala State University of Grodno, Belarus

Resumo

We consider a singularly perturbed linear systems with a small multiplier for the derivatives and with a delays in the state variables (SPLSD). Singularly perturbed controlled systems occur as models in automatic control theory, nonlinear oscillation theory, quantum mechanics, gas dynamics, biology, chemical kinetics and others. The presence of small parameter such as time constants, masses, moments of inertia, inductances and capacitances is the source for increased order of the system.

The suppression of a small parameter is responsible for the degeneration of the dimension of the system (its singularity). Such a system possesses widely separated groups of eigenvalues exhibiting slow and fast phenomena or time-scale behavior.

Time-delay systems arise from inherent time-delays in the components of the systems, or from the deliberate introduction of time-delays into the systems for control purposes. Time-delays occur often in systems in engineering, biology, chemistry, physics, ecology, economics, technology, social sphere, etc.

Features of mathematical control theory problems for SPLSD will be described, some methods for the solution of stability, stabilizability, controllability and observability problems of such systems will be described. Conditions under which the system has these properties will be presented. The conditions are formulated in terms of the matrix parameters of the system, have a rank type, are independent of a small parameter, and are valid for all sufficiently small values of this parameter.