First Congress of Greek Mathematicians
Special Session in Control Theory, Optimization and Operations Research
June 29, 2018

Organizers

Nicholas Karampetakis – Ioannis Tsinias

Time Schedule of Talks

	Friday, June 29
17:00 – 17:30	Vardulakis
17:30 – 17:50	Kritikos
17:50 – 18:10	Kheiri

Speakers

Hossein Kheiri (University of Tabriz, Iran)
Optimal Control of a Fractional Order HIV Model

In this paper, a fractional order HIV model with both virus-to-cell and cell-to-cell transmissions is considered. We incorporate into the model a combined antiretroviral (cARV) drug, as time dependent control, aimed at controlling the spread of HIV infection and formulate an optimal control problem with free terminal time. Necessary conditions for a state/control/terminal time triplet to be optimal are obtained. We simulate the obtained problem with Maple software. Numerical examples show the efficiency of the proposed method.

Joint work with Mohsen Jafari.

Manolis Kritikos (Athens University of Economics and Business)
The capacitated minimum spanning tree problem and its variants

We consider the Capacitated Minimum Spanning Tree problem (CMST) and its variants. The CMST is one of the fundamental problems of Operations Research and plays an important role in the design of telecommunications networks, in distribution, transportation, and logistics. The Capacitated Minimum Spanning Tree (CMST) is an extension of the minimum spanning tree problem (MST) which considers a central vertex which receives and sends commodities (information, goods, etc.) to a group of terminals but the flow of commodities are limited by the capacity of either the server or the connection lines. The CMST problem is a NP-hard problem and it is very difficult to find optimal solutions with exact methods. It explains why heuristic methods have been widely used in many of the research works nowadays. Nonetheless, there are also many exact methods for moderate size problems. We model the capacitated minimum spanning tree problem with time windows (CMSTPTW) and propose new heuristics for the CMST and for its variants. Computational results show that the proposed heuristics provide extremely good performance results on benchmark problems.

Antonis Vardulakis (Aristotle University of Thessaloniki)
Linear Multivariable Control. Methods & Philosophy of the Algebraic Approach or variations on an old theme by Euclid of Alexandria

In this talk I look at what I believe to be the cornerstones behind the methods and the philosophy in the development of the solution to the problem of designing Stabilizing

Controllers for single-input single-output or multi-input multi-output (multivariable) linear systems via what is known as the Linear Multivariable Control System analysis and synthesis methods via the Algebraic Approach.

I will try to show that there is a common ground among key concepts, ideas and results found in the work of pioneers in this research area, and of many other whose work was influenced by them, and some very old questions and answers posed for the first time in recorded history some 2500 years ago in these parts of the world and comprising what is nowadays known as the Euclidean algorithm.

I will briefly examine some key concepts and results developed during the last 50 years mainly through the research efforts of three individuals who, I believe, laid the foundations of a very active research area which is known in the control literature as the "polynomial equation or polynomial matrix approach".

It is my thesis that the main figures that shaped this area of research and deeply influenced the key developments in the field and the research efforts of many workers including mine, are in order our personal scientific development: late Prof. H. H. Rosenbrock, FRS, Head during the seventies of the Control Systems Centre at the University of Manchester Institute of Science and Technology (UMIST), U.K., Prof. W. A. Wolovich, at the Division of Engineering of Brown University, U.S.A and Prof. Ing. Vladimir Kucera, Faculty of Electrical Engineering, Czech Technical University in Prague and Head of the Center for Applied Cybernetics, Czech Technical University in Prague.

It is also my thesis that the main underlying concepts and results developed by these great researchers are based on the "Euclidean Algorithm" which was firstly recorded in Alexandria by Euclid in his book known as the "Elements".