



Nell'ambito del programma di dottorato del DMI

**il Prof. Vasile Staicu
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terrà un corso breve dal titolo:

An introduction to Mathematical Theory of Control

7, 9, 11 maggio 2018, ore 15:00 - 17:00

(Aula B - Dip. di Matematica e Informatica, via Ospedale 72)

Abstract

In this short course, we introduce the notions of control systems, of differential inclusions and show that differential inclusions provide a convenient alternative approach for the analysis of control systems.

We start with some mathematical preliminaries including the Banach contraction mapping principle, elements of Lebesgue measure theory and elements of multivalued analysis.

Then we proceed with the basic facts on Caratheodory solutions to ordinary differential equations essential for applications to control problems: existence, uniqueness and dependence on data of Carathéodory solutions and characterization of maximal solutions.

Now we are ready to introduce control systems and optimal control problems. We introduce an equivalent differential inclusion associated to a control system and prove Filippov's result. We proceed with the fundamental properties of trajectories and of reachable sets of a nonlinear control system. Then we introduce the minimum time function, the minimum time problem and the Bellman optimality principle. We introduce then optimal control problems and study the existence of optimal controls for Mayer problems and for the problem of Bolza. Then we derive necessary and sufficient conditions for optimality.

References

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Vasile Staicu è Profesor Catedrático presso l'Università di Aveiro (Portogallo), *fellow* presso diverse istituzioni di ricerca (CNR, SISSA, ICTP, Università di Bucarest et al.), dirige la rivista *Libertas Mathematica*, autore di più di 80 pubblicazioni scientifiche fra articoli su rivista e capitoli di libri, autore o *editor* di 3 libri. I suoi principali campi di ricerca sono i metodi variazionali e topologici per le equazioni e inclusioni differenziali, la teoria dei controlli e l'analisi multivoca.