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*"La mente è come un paracadute.
Funziona solo se si apre"
A. Einstein*

State Space Representation of All Stabilizing Controllers (Cancelled)

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Abstract

Most control systems are designed to be stable and to meet additional specifications, such as optimality and robustness. It is therefore natural to design the systems step by step: stabilization first, then the additional specifications each at a time. For this it is obviously necessary to have any and all solutions of the current step available before proceeding any further.

This motivates the need for all controllers that stabilize a given system. In fact, this is an infinite family and we find it convenient to describe it in a parametric form, known as the Youla-Kučera parameterization. The additional specifications are then met by selecting an appropriate parameter. Such a procedure is simple, systematic, and transparent.

The seminar will recall a transfer function approach to the parameterization of all stabilizing controllers and proceed with a state space approach. It will be shown how doubly coprime fractional representations of a system can be obtained by applying to it a stabilizing state feedback and a stabilizing output injection. Consequently, all controllers that stabilize a given system are built around an observer-based central stabilizing controller.

The lecture has a significant pedagogic value. State space and transfer function techniques are presented as connected approaches, rather than isolated alternatives.

Due to incoming flights restrictions, the talk has been cancelled. We apologize for the inconvenience.