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## Operators and Feedback Control Theory: Linear Switched Systems

**Abstract**

Switching is a common feature in models for systems comprised of interacting software and physical processes, and in this talk we will focus on a special type of hybrid model called a linear switched system. In discrete time, these systems are represented by difference equations in which the defining system matrices are functions of a parameter taking values in a finite set; further, this discrete parameter evolves, or indeed switches, according to a transition system which in the simplest case is an automaton. The talk will focus on such linear switched systems in a feedback control context-both centralized and decentralized-and how they can be systematically analyzed using a combination of state space methods, operator theory and semidefinite programming. As a start, we will investigate the property of stability, and also the more involved attribute stabilizability-whether a feedback policy exists to stabilize an inherently unstable system. In each case we show that the property can be checked exactly from a nested chain of semidefinite programs: feasibility of any program in the chain provides a mathematical certificate that the property holds; using the concept of a multi-norm, we further show that infeasibility provides information about the degree to which the property may be attainable. More generally, we consider performance metrics for switched systems, and present results on performance verification, and automated synthesis of feedback policies. We will also discuss connections to the joint spectral radius of a set of matrices, and Markovian jump linear systems.

Talk time: 07/21/2016 9:00AM— 07/21/2016 9:30AM
Talk location: Brown Hall 100