Hamilton Institute

Robust & Optimal Control of Constrained Linear Systems

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Abstract
The problem of finding optimal control laws for constrained linear systems *without* disturbances or model uncertainty is relatively well-understood. However, existing results, which allow for the explicit incorporation of disturbances or model mismatch in the optimal control problem formulation, are either too conservative or computationally intractable. Much of current research in optimal control is therefore aimed at finding non-conservative and computationally efficient methods for the optimal control of uncertain systems with constraints on the state and input.

This talk considers the problem of finding a sequence of affine state feedback control laws that guarantees the satisfaction of input and state constraints for all time, despite the presence of a bounded disturbance on the state. We will assume that the system is linear and discrete-time, and that the constraints on the state, input and disturbance are described by linear inequalities.

It is well-known that this control problem is non-convex in the space of decision variables, which implies that it is very difficult to find a solution. However, by applying some recent results from the literature on robust optimisation, we will show that this control problem can be solved in a tractable fashion by re-parameterising the control problem and formulating it as a convex optimisation problem. We will also outline how this alternative parameterisation can be used to efficiently compute receding horizon controllers with robust stability guarantees.

Venue: Seminar Room, Hamilton Institute, Science Building, NUI Maynooth

Time: 1.00 - 2.00pm (followed by tea/coffee)

Travel directions are available at www.hamilton.ie

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