

Tuesday, March 3, 2009

4:00 pm

in Room 303 MAE-A

Adaptive Control Based on Retrospective Cost Optimization

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Abstract

Optimal and robust control laws often require detailed models and thus are difficult to apply in practice. In contrast, adaptive control laws—which are essentially highly robust, nonlinear control laws—require much less modeling information, and can tune themselves to the true plant, thus overcoming the classical tradeoff between robustness and performance. Adaptive control represents the final frontier in the evolution of control theory toward decreased model dependence and therefore increased autonomy.

This talk will focus on adaptive control theory based on a novel retrospective cost criterion. The idea is simple and appealing: optimize the feedback gains based on past data rather than predicted behavior. This technique leads to easily implementable adaptive algorithms for stabilization, command following, and disturbance rejection that requires limited modeling information, specifically, knowledge of only the nonminimum-phase zeros of the plant captured by estimated Markov parameters. The methodology is carried out in a discrete-time framework that facilitates embedded implementation without the need for controller discretization. This talk will review the elements of retrospective-cost-based adaptive control, and demonstrate its features and performance through examples from noise, vibration, and flight control.

This seminar represents joint work with Ravi Venugopal, Jesse Hoagg, and Mario Santillo.

Biography

Dennis S. Bernstein is a professor in the Aerospace Engineering Department at the University of Michigan. He received the Ph.D. from the University of Michigan, and held positions at Lincoln Laboratory and Harris Corp. He is Editor in Chief of the *IEEE Control Systems Magazine*.

Refreshments served in 303 MAE-A beginning at 3:50 pm

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