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A New Framework for Robust Control

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ABSTRACT:

In this talk a new framework for robust control will be presented. The framework is based on the theory of polynomial chaos for dynamical systems. The problem considered here includes design of controllers for dynamical systems in the presence of parametric uncertainty and system nonlinearities. Uncertainty and nonlinearity are modeled as random variables. Tools from polynomial chaos are applied to formulate convex optimization problems to synthesize controllers that achieve the desired performance in the average sense. The algorithms are applied to realistic flight control problems and compared with worst-case formulations and randomized algorithms. The proposed framework is shown to be computationally efficient and results better performing controllers.

BIOGRAPHY:

Raktim Bhattacharya received his M.S. and PhD in Aerospace Engineering from the University of Minnesota in 2000 and 2003 respectively. He was a postdoctoral researcher in Control & Dynamical Systems at Caltech from 2003 to 2004. He spent 2004-2005 at United Technologies Research Center, East Hartford, CT, as a research scientist in the Controls and Embedded Systems Group. He joined Texas A&M University in 2005 and is currently an Associate Professor in the Department of Aerospace Engineering at Texas A&M University. He has published several journal & conference papers and book chapters in the area of probabilistic robust control, nonlinear estimation, UQ in hypersonic flight problems, nonlinear trajectory generation, anytime control algorithms, and receding horizon control methodologies. His research is funded by NASA, AFOSR & NSF.