

Stochastic Hybrid Systems

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Abstract

This talk summarizes recent efforts to formulate and analyze the role of uncertainties in hybrid dynamical systems. We first introduce a generalized stochastic hybrid system, formulated within the framework of measure theory, which accommodates various types of uncertainties arising in both continuous and discrete flows. Next, we construct the stochastic Koopman operator and the Frobenius–Perron operator for the stochastic hybrid system. These operators are then employed to study mean-field games and mean-field control for hybrid systems, with an application to modeling crowd escape behaviors. Finally, we present an intrinsic formulation of Brownian motion, as a preliminary step toward constructing stochastic hybrid systems on abstract manifolds.

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