Abstract:

Feedback control design plays a fundamental role in modern engineering by yielding real-time robustness to dynamical perturbations. For an optimality-based formulation of the feedback control problem, the Dynamic Programming Principle allows the characterization of the associated value function as the viscosity solution of a first-order, fully nonlinear Hamilton-Jacobi-Bellman equation. This equation is defined over the state-space of the controlled dynamical system and therefore, even control problems over low-dimensional dynamics lead to HJB equations of high complexity. In this talk, we present an approximation framework to compute (sub)optimal feedback controllers by means of an iterative procedure over a stabilizing control law combined with a spectral approximation scheme. Problems arising from the feedback control of partial differential equations illustrate the effectiveness of our approach in a high-dimensional context.