

High Performance Computing for HJB Equations and Application to Optimal Control Problems

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Abstract: The talk is concerned by the resolution of Hamilton-Jacobi-Bellman (HJB) equations for computing value functions associated with deterministic optimal control problems in presence of state constraints.

HJB equations are nonlinear partial differential equations. Their numerical approximation rises several challenging issues. One of these issues is the fact that the equations are posed in a multi-dimensional space (the dimension being the number of state variables) and that the computing cost usually increases exponentially with the dimension of the problem.

The talk will focus on recently developed high-performance computing tools for solving such HJB equations in a reasonable time, and on optimal trajectory reconstruction for the related optimal control problems. Cost reduction techniques will be proposed in order to rigorously perform the approximation of the HJB equation in a subdomain of interest.

Several numerical examples will be given in order to illustrate the performances of the proposed methods.

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