27th IFIP TC7 Conference 2015 on System Modelling and Optimization

Optimal control and Hamilton-Jacobi-Bellman equations: Numerical methods and Applications

A dynamical programming approach for sparse optimal control problems

Zhiping Rao

Johann Radon Institute of Computational and Applied Mathematics, Austrian Academy of Sciences, Linz, Austria

zhiping.rao@ricam.oeaw.ac.at

Abstract: A class of optimal control problems involving L^p-type penalties where $p \in (0, 1]$ is discussed. This type of penalization can promote sparse controls but it is non-convex when $p < 1$. We consider the problem with time discretization which is then reformulated as a non-convex problem in infinite dimensional sequence space ℓ^p. An existence result is derived for the time-discretized problem and a dynamical programming approach is proposed. The sparsity of optimal controls is illustrated by numerical examples.