On synthesizing impulsive controls and the theory of fast controls

Aleksandr B. Kurzhanski

Moscow State University, Moscow, Russia
e-mail: kurzhans@mail.ru, kurzhan@cs.msu.su

The report deals with the problem of constructing closed-loop (feedback) controls for systems that allow impulsive control inputs described through generalized "delta" functions and their derivatives. Such problems, having had a serious applied motivation, were mostly considered within the framework of open-loop control. The present report emphasizes dynamic programming techniques as applied to problems of feedback control. For systems with original linear structure the solution is attained through combining methods of classical theory of distributions with those of the theory of quasivariational inequalities rooted in generalization of the Hamiltonian formalism. Described also are physically realizable approximations of the originally introduced "ideal" solutions. These approximate control strategies allow to attain the goals of the control process in arbitrary small "nano"-time.