Filippov approach in stochastic maximum principle without differentiability assumptions

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Abstract

In this article, we establish necessary conditions for optimality in stochastic control of systems governed by stochastic differential equations with nonsmooth coefficients. The approach used is based on the approximation of the nonsmooth coefficient by smooth one which generate a sequence of smooth control problems. Ekeland's variational principle is then applied to obtain a sequence of nearly optimal controls which satisfy necessary conditions for near optimality. By using the generalized notion of Filippov's solutions and the stable convergence, we obtain an explicit formula for the adjoint process and the inequality between the Hamiltonians, on a good extension of the initial filtered probability space.

Keywords : Stochastic differential equation; generalized Filippov's solutions; optimal control; maximum principlel Ekeland's variational principle.

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