Vârsan, C.; **Popescu-Bodorin, N.**

Stochastic Hamiltonians associated with stochastic differential equations and non-smooth final value. (English) Zbl 1150.60398

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Summary: For a given Lipschitz continuous function $\varphi(x) : \mathbb{R}^d \to \mathbb{R}$ admitting a weak gradient $\partial_x \varphi(x) : \mathbb{R}^d \to \mathbb{R}^d$ we associate the random variable $\varphi(x(T))$, where $x(t), t \in [0,T]$ is the solution of a stochastic differential system with Lipschitz continuous coefficients and first order continuously differentiable difussion coefficients. It is proved that the random variable $\varphi(x(T))$ can be represented as a final value $S(T, x(T)) = \varphi(x(T))$ using a continuous function $S(t,x) : [0,T] \times \mathbb{R}^d \to \mathbb{R}$ which admits a weak gradient $\partial_x S(t,x) : [0,T] \times \mathbb{R}^d \to \mathbb{R}^d$ and $S(t, x(t)),\ t \in [0,T]$, fulfills a first order stochastic differential equation (the stochastic differential $d_t[S(t, x(t))]$ equals a stochastic hamiltonian). It can be meaningful for getting feedback optimal control associated with stochastic control problems and for describing an admissible feedback strategy involved in a financial market.

MSC:

60H15 Stochastic partial differential equations (aspects of stochastic analysis)
93C42 Fuzzy control/observation systems

Keywords:

linear order stochastic differential equations; weak solutions; representation of a random variable