Electronic Communications in Probability > Vol. 11 (2006) > Paper 9 open journal systems

A Controller And A Stopper Game With Degenerate Variance Control

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Abstract

We consider a zero sum stochastic differential game which involves two players, emph{the controller} and emph{the stopper}. The stopper selects the stopping rule which halts the game. The controller chooses the diffusion coefficient of the corresponding state process which is allowed to degenerate. At the end of the game, the controller pays the stopper, the amount $ Eint_{0}^{tau} e^{-alpha t} C(Z_x(t))dt $, where $Z_x(cdot)$ represents the state process with initial position x and $alpha $ is a positive constant. Here $C(cdot)$ is a reward function where the set $ {x: C(x)>0}$ is an open interval which contains the origin. Under some assumptions on the reward function $C(cdot)$ and the drift coefficient of the state process, we show that this game has a value. Furthermore, this value function is Lipschitz continuous, but it fails to be a C^1 function.

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Published on: July 4, 2006

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Electronic Communications in Probability. ISSN: 1083-589X