

1086-60-381

Yipeng Yang* (yangyip@missouri.edu), Department of Mathematics, University of Missouri, Columbia, MO 65211. *Multi-dimensional Stochastic Singular Control Via Dynkin Game and Dirichlet Form*. Preliminary report.

The traditional difficulty about stochastic singular control is to characterize the existence and regularities of the value function and the optimal control policy. In this paper, a multi-dimensional singular control problem is considered. We found the optimal value function and the optimal control policy of this problem via Dynkin game, whose solution is given by the saddle point of the cost function. The existence and uniqueness of the solution to this Dynkin game are proved through an associated variational inequality problem involving Dirichlet form, and the non-existence of exceptional set in higher dimensional space is proved using the absolute continuity of the probability transition function of the underlying process. We also showed that the integrated form of the value function of the Dynkin game yields the value function of the singular control problem. As a consequence, the properties of the value function of this Dynkin game implies the smoothness of the value function of the stochastic singular control problem. In this way, we are able to show the existence of a classical solution to this multi-dimensional singular control problem, which was traditionally solved in the sense of viscosity solutions. (Received August 27, 2012)