

SLIDING MODE VARIABLE STRUCTURE CONTROL FOR UNCERTAIN STOCHASTIC SYSTEMS

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ABSTRACT. *In this paper, the sliding mode variable structure control for a class of uncertain stochastic systems is investigated. Firstly, the sliding surface is established and the variable structure control law of the system is designed. Then it is proved that the sliding mode is subordinated reachable and a sufficient condition for mean-square asymptotical stability of the sliding mode motions is given. Finally, a numerical example is given to demonstrate the effectiveness of results obtained in this paper.*

Keywords: Mean-square stability, Variable structure control, Uncertainty

1. Introduction. The variable structure control (VSC) theory has made great progress since it was proposed in the 1950's [1-7]. Owing to its simple design, easy implementability and insensitively to system perturbations, VSC is a successful control method and has been applied to many complex systems [8-12]. However, it is regretful that the VSC approach has received little attention in stochastic control until recently [13-21].

At present, there has been little work undertaken on the VSC problem of uncertain stochastic systems. The existence of uncertainties will make the problem more complex and challenging. In this paper, we consider the VSC problem of uncertain $It\hat{o}$ stochastic systems. When discussing VSC problem of the stochastic systems, the equivalent control methods is usually used to solve the variable control law. However, the variable control law obtained usually contains the stochastic noise items, which is difficult to realize in the engineering design. For the sake of cancelling the random noise item in the variable control law, it is usually necessary to strengthen restricted conditions to the system.