A MAXIMUM PRINCIPLE FOR INFINITE HORIZON DELAY EQUATIONS

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Extended Abstract

We consider the stochastic optimal control problem on infinite horizon for partial information with delay where a controlled system is described by a stochastic delay differential equation driven by a Brownian motion and an independent compensated Poisson random measure of the form:

\[
\begin{align*}
&dX(t) = b(t, X(t), Y(t), A(t), u(t)) dt + \sigma(t, X(t), Y(t), A(t), u(t)) dB(t) \\
&\quad + \int_{\mathbb{R}} \theta(t, X(t), Y(t), A(t), u(t), z) \tilde{N}(dt, dz); t \in [0, \infty) \\
&X(t) = X_0(t); \quad t \in [-\delta, 0] \\
&Y(t) = X(t - \delta) \\
&A(t) = \int_{t-\delta}^{t} e^{-\rho(t-r)} X(r) dr
\end{align*}
\]

The problem is to optimize the criteria \( J(u) \) such that

\[
J(u) = E \left[ \int_{0}^{\infty} f(t, X(t), Y(t), A(t), u(t)) \, dt \right]
\]

over an admissible control domain which is convex. Moreover, the admissible control processes are adapted to a subfiltration of the filtration generated by the underlying Poisson random measure and a Brownian motion.

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We establish first and second sufficient stochastic maximum principles as well as necessary conditions for that problem. Then, we illustrate our results by an application to the optimal consumption rate from an economic quantity. Finally, we prove an existence and uniqueness of the advanced backward stochastic differential equations on infinite horizon with jumps.

References


