

Dokuchaev, N. G.; Yakubovich, V. A.

Optimal programmed control of stochastic plants with constraints on the state for each time instant. (English. Russian original) [Zbl 0554.93074](#)

Autom. Remote Control 45, 859-866 (1984); translation from *Avtom. Telemekh.* 1984, No. 7, 49-57 (1984).

A stochastic plant is described by means of the differential equation $(dx/dt) = f(x(t), u(t), t, \omega)$, $0 \leq t \leq T$, $x(0) = a(\omega)$, where $x(t)$ is the random state n -vector, $u(t)$ is a deterministic control m -vector, ω is a random parameter and $a(\omega)$ is the random initial state. Furthermore, the control $u(\cdot)$ is a piecewise continuous function from $[0, T]$ into a bounded subset Δ of \mathbb{R}^m . There are inequality and equality constraints for the plant connecting the means of certain functions of $(x(t), u(t), t, \omega)$, $0 \leq t \leq T$. The cost function $\phi = \phi(u(\cdot), T)$ to be minimized subject to $u(\cdot)$ and T involves again means of some functions of $(x(t), u(t), t, \omega)$, $0 \leq t \leq T$. Necessary optimality conditions are given by means of a "stochastic maximum principle".

Reviewer: [K.Marti](#)

MSC:

[93E20](#) Optimal stochastic control

[49K45](#) Optimality conditions for problems involving randomness

[93C10](#) Nonlinear systems in control theory

[93C15](#) Control/observation systems governed by ordinary differential equations

[34F05](#) Ordinary differential equations and systems with randomness

Keywords:

stochastic plant; inequality and equality constraints; stochastic maximum principle