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Section:

17. Control Theory and Optimization

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Effective control and observation in the multistage stochastic optimization problem

The effective control problem for a multistage system: $x_{k+1} = A_k x_k + b_k + \zeta_k$, $w_{k+1} = r w_k + u_k^T x_k + (u_k - u_{k-1})^T c_k$ with observation: $y_{k+1} = G_{k+1} x_{k+1} + \eta_{k+1}$ is considered $(k = 0, 1, \cdots, N)$. Here ζ_k, η_k, c_k are independent Gaussian vectors with known distributions parameters. The effective controls u_k are selected by two criteria: the first is maximization of a mean value of the control utility w_N, the second is minimization of it's variance. The connection and separation of the problems of control and observation are studied on the base of theory of control under uncertainty [1]. A notion of a dual stochastic optimization problem is introduced. In case of the linear restrictions on permissible controls an algorithm [2] may be used for the effective controls construction.

Reference: [1] A. B. Kurzhanski, Control and observation under uncertainty, Nauka, Moskow(1987)

[2]I. Ya. Katz, G. A. Timofeeva Bicriterial problem of stochastic optimization. Avtomatica & Telemech. (Russian) 3(1997),116-123.