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**Asymptotic ordering of probability distributions for linear controlled systems with quadratic cost.** (English) [Zbl 0588.93070](#)

Stochastic differential systems, Proc. 3rd Bad Honnef Conf. 1985, Lect. Notes Control Inf. Sci. 78, 277-283 (1986).

[For the entire collection see [Zbl 0579.00014](#).]

Autonomous linear controlled systems subject to white noise disturbances are considered. By  $C_T$  the associated quadratic cost up to time  $T$  is denoted. Under the optimal stationary control the average cost attains its minimal value  $\theta$  as  $T \rightarrow \infty$ . Moreover,  $(C_T - \theta T)/\sqrt{T}$  has asymptotically the normal distribution  $N(0, \Delta)$  where  $\Delta$  is a variance parameter.

It is shown that under rather general conditions this is the best result achievable. Namely,  $N(0, \Delta)$  is the lower bound for the asymptotic distributions of  $(C_T - \theta T)/\sqrt{T}$  in the sense of stochastic ordering. Conditions for the attainability of this lower bound and extensions to the nonautonomous case are presented.

**MSC:**

- [93E20](#) Optimal stochastic control
- [62E20](#) Asymptotic distribution theory in statistics
- [93C05](#) Linear systems in control theory
- [60H10](#) Stochastic ordinary differential equations (aspects of stochastic analysis)
- [93C99](#) Model systems in control theory

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**Keywords:**

Autonomous linear controlled systems; white noise disturbances; quadratic cost; asymptotic distributions; stochastic ordering