

ON THE LYAPUNOV STABILITY OF MECHANICAL SYSTEMS PERTURBED BY WHITE NOISES

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Received August 9, 1988

Abstract

A number of problems in mechanics, physics and applications are described by linear Ito stochastic differential equations of the form

$$Ddx = Axdt + B(\varepsilon)x dW. \quad (1)$$

Yu. A. MITROPOLSKIJ and D. G. KORENEVSKIJ (1985—1986) have given some effective criteria for the asymptotic stability of solutions of (1) with small $\varepsilon > 0$. However, by a simple counter-example we have discovered that a criterion of those authors is only sufficient condition, but not a necessary one.

By using a quite different tool, namely the Lyapunov exponent method, in this talk we derive much more effective sufficient conditions ensuring the asymptotic stability of the trivial solution $x = 0$ of (1). In some cases our conditions are not only sufficient, but also necessary. The effectiveness of our results is illustrated by concrete numerical examples.

A general algorithm for solving the problem is also given and it can be easily used on computers.

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