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12. Probability and Statistics

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Stability Maps for Systems with Noise Induced Stability

A system like an inverted pendulum standing on a membrane can be stabilized by randomly vibrating the supporting membrane, provided suitable noise is used. (White noise, d(Wiener), is not suitable, but d(Ornstein-Uhlenbeck) is.) The originally unstable equilibrium becomes stable, if the top Lyapunov exponent L associated with the noise perturbed system becomes negative. The generator of such a system is non-elliptic. Stochastic numerical schemes are discusssed to compute L as function of damping b and noise intensity 1/epsilon for such a degenerate system; in particular, the border line L(b, epsilon)=0 is considered.