Effect of Asymmetric Potential and Gaussian Colored Noise on Stochastic Resonance

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Abstract: The phenomenon of stochastic resonance (SR) in a bistable nonlinear system is studied when the system is driven by the asymmetric potential and additive Gaussian colored noise. Using the unified colored noise approximation method, the additive Gaussian colored noise can be simplified to additive Gaussian white noise. The signal-to-noise ratio (SNR) is calculated according to the generalized two-state theory (shown in [H.S. Wio and S. Bouzat, Brazilian J. Phys. 29 (1999) 136]). We find that the SNR increases with the proximity of a to zero. In addition, the correlation time τ between the additive Gaussian colored noise is also an ingredient to improve SR. The shorter the correlation time τ between the Gaussian additive colored noise is, the higher of the peak value of SNR.

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