Nonlinear Sciences > Chaotic Dynamics

Sequential vibrational resonance in multistable systems

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The phenomenon of sequential vibrational resonance existed in a multistable system that is excited by both high- and low-frequency signals is reported. By the method of direct separation of motions, the theoretical investigation on vibrational resonance is conducted in both cases of underdamped and overdamped, and the analytical predictions are in good agreement with the numerical simulations. In view of the theoretical results, the zero-order Bessel function related to the high-frequency signal is included in the renormalized resonant frequency, and which leads to the appearance of the sequential vibrational resonance. In the case of underdamped system with small damping coefficient, the resonance occurs in a series of discrete parameter regions. The sequential vibrational resonance is different from the traditional multiple vibrational resonance, because its appearance is much more regular. The results in this work may be helpful in the field of signal processing electronics, especially for dealing with the very-low-frequency signal.

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