Peng, Jiahui; Wang, Liang; Wang, Bochen; Jing, Kangkang; Xu, Wei
The stochastic bifurcation of the vibro-impact system on the impact surface via a new path integration method. (English) Zbl 07387857
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Summary: In this paper, a new path integration algorithm is proposed for the non-autonomous vibro-impact system. It can be used to obtain the stochastic response of the system at the impact instant. The innovation of this algorithm is that the fixed excitation phase at the impact instant is introduced. The fixed excitation phase and the impact surface are combined as the special impact surface, and the algorithm sets up the different evolution methods of the probability density function and the impact completion condition. It can directly capture the stochastic response of the system at the impact instant without any non-smooth approximations. The non-smooth characteristics of the impact can be well preserved. This new path integration algorithm has good applicability. It has no limitation on the restitution coefficient. The design idea of this algorithm may provide a framework for the non-smooth system subject to the periodic excitation. In the end, a linear vibro-impact system and a nonlinear vibro-impact system excited by the external periodic force are used as examples to show how our method could be implemented. The stochastic P-bifurcation phenomena induced by parameters also are considered. The Monte Carlo simulations verify the effectiveness and accuracy of the proposed path integration algorithm.

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References:


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