

Nonlinear vibration of Bernoulli-Euler beam resting on a Winkler elastic foundation

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Abstract: In this paper, a Bernoulli-Euler beam resting on a Winkler elastic foundation is studied. The considered beam is assumed to be pinned-pinned with a linear torsional spring at one end and the effect of the axial force induced by mid-plane stretching is considered in the investigation of the nonlinear dynamic behavior of the beam. The governing partial differential equation is discretized using Galerkin method and the nonlinear differential equation is analytically solved. The proposed procedure is independent on the presence of small or large parameters in the equation under study and the approximate analytical solution obtained after the first iteration is very accurate, which prove the reliability and effectiveness of the proposed approach.

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