

عنوان مقاله:

Modified Multi-level Residue Harmonic Balance Method for Solving Nonlinear Vibration Problem of Beam Resting on Nonlinear Elastic Foundation

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خلاصه مقاله:

Nonlinear vibration behavior of beam is an important issue of structural engineering. In this study, a mathematical modeling of a forced nonlinear vibration of Euler-Bernoulli beam resting on nonlinear elastic foundation is presented. The nonlinear vibration behavior of the beam is investigated by using a modified multi-level residue harmonic balance method. The main advantage of the method is that only one nonlinear algebraic equation is generated at each solution level. The computational time of using the new method is much less than that spent on solving the set nonlinear algebraic equations generated in the classical harmonic balance method. Besides the new method can generate higher-level nonlinear solutions neglected by previous multi-level residue harmonic balance methods. The results obtained from the proposed method compared with those obtained by a classical harmonic balance method to verify the accuracy of the method which shows good agreement between the proposed and classical harmonic balance method. Besides, the effect of various parameters such as excitation magnitude, linear and nonlinear foundation stiffness, shearing stiffness etc. on the nonlinear vibration behaviors are examined

کلمات کلیدی:

Harmonic balance, Nonlinear dynamics, Nonlinear foundation, Large amplitude vibration

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