DETC2011-48043   *Technical Publication*

Analytical Solutions for Oscillation of Plate on a Nonlinear Winkler Foundation

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Abstract

   In this paper the closed form expressions for the dynamic response of an elastic plate rested on a nonlinear elastic foundation are obtained. The nonlinear governing equation is solved using both the Variational Iteration Method (VIM) and the Homotopy Analysis Method (HAM). The frequency responses are presented in the closed form and their sensitivity analyses with respect to their initial amplitudes are investigated. A number of numerical simulations are then carried out and the performance and validity of the solution procedure is evaluated in the time domain. It is proved that the both VIM and HAM are quite reliable and straightforward techniques to solve the corresponding set of nonlinear differential equations and also capable of obtaining the main harmonics of the system.

Session: VIB-10-2 Nonlinear Dynamics of Continuous Systems II

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