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Simulations of transverse vibrations of an axially moving string: a modified difference approach. (English) Zbl 1329.74301

Summary: A modified finite difference approach to simulate transverse vibrations of an axially moving string is presented. The stress is treated as a new unknown in discretization of the spatial variable. A set of differential-algebraic equations is established based on the discreted governing equation and the constitutive relation. For linear vibrations, a conserved functional is employed to test the algorithm, and the 1, 2, 3, 4-term truncated modal analytical solutions are compared with the numerical solution. For the free nonlinear vibration, a new conserved functional is used to check the algorithm. Effects of the transport speed on the free and forced nonlinear vibrations are numerically investigated.

MSC:

74S20	Finite difference methods applied to problems in solid mechanics
65M06	Finite difference methods for initial value and initial-boundary value problems involving PDEs
74H45	Vibrations in dynamical problems in solid mechanics
74K05	Strings

Cited in **10** Documents

Full Text: DOI

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