

Refined geometrically nonlinear equations of motion for elongated rod-type plate

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Abstract

© 2016, Allerton Press, Inc. We derive new refined geometrically nonlinear equations of motion for elongated rod-type plates. They are based on the proposed earlier relationships of geometrically nonlinear theory of elasticity in the case of small deformations and refined S. P. Timoshenko's shear model. These equations allow to describe the high-frequency torsional oscillation of elongated rod-type plate formed in them when plate performs low-frequency flexural vibrations. By limit transition to the classical model of rod theory we carry out transformation of derived equations to simplified system of equations of lower degree.

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Keywords

classical model, elongated rod-type plate, equations of elasticity theory, equations of motion, geometric nonlinearity, kinematic relationships in the quadratic approximation, optimization, simplified equations of motion, Timoshenko's model