

ИНФОРМАЦИИ О ДОКУМЕНТЕ

An evaluation of displacement-based finite element models used for free vibration analysis of homogeneous and composite plates

Коллекция: Статті »

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Аннотация (English): The finite element vibration analysis of plates has become one of the classical problem over the past several decades. Different finite element plate models based on classical, standard and improved shear deformable plate theories, three-dimensional elasticity equations or their combinations have been developed. The ability and accuracy of each such model can be established by validating it against analytical models, if it is possible, or other numerical models. In this paper, a comparative study of different plate finite element models used for the free vibration analysis of homogeneous isotropic and anisotropic, composite laminated and sandwich thin and thick plates with different boundary conditions is presented. The aim of the study is to find out the weaknesses and strengths of each model used and to pick out their interchangeability for the finite element calculations. For comparisons, the plate models based on classical and first-order shear deformation theories within the framework of both single-layer and layer-wise concept and three-dimensional theory of elasticity are used. The models are created using the finite element package ABAQUS™. Natural frequencies obtained by the authors are compared with results known in the literature from different analytical or approximate solutions and, then, the correlation between them is discussed in detail. At the end, conclusions are drawn concerning the utility of each model considered for vibration predictions of plates.

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