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Analysis of functionally graded sandwich plates using a higher-order layerwise theory

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Abstract

A higher-order layerwise finite element formulation is presented for static and dynamic analyses of functionally graded material (FGM) sandwich plates. A higher-order displacement field is assumed for core and first-order displacement field is assumed for top and bottom facesheets maintaining a continuity of displacement at layer interface. An eight noded isoparametric element using a C^0 based finite element formulation with thirteen degrees of freedom per node has been considered in the present work. Two configurations of FGM sandwich plates, one with FGM core and homogenous facesheets and second having top and bottom layers made of FGM and homogenous core are considered. Effective material properties of the FGM are computed using rule of mixture (ROM). In order to establish the correctness of the present finite element formulation for wide range of problems for two configurations of FGM sandwich plates, comparison studies are presented. Next, parametric studies are taken up to investigate the effects of volume fraction index, span to thickness ratio and boundary conditions on static and dynamic behavior of FGM sandwich plate. It is shown

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