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ABSTRACT

The non-linear response of a sandwich panel with the core that consists of a functionally graded material (FGM) undergoing in-plane loading is investigated. The panel consists of two face sheets, metallic or composite laminated, and an FGM core that is a medium whose mechanical properties change through the depth facilitating a desirable response of the structure. The effect of the FGM core is introduced through the constitutive relations that affect conventional and high-order stress resultants and stress couples in the panel. The formulation employs the Extended High-Order Sandwich Panel Theory (EHSAPT) to assess the effect of the FGM material of the core. A variational approach is adopted to derive the linear and non-linear governing equations with a prescribed FGM distribution through the depth of the core. The wrinkling study of FGM panels includes two loading scenarios where in-plane loads are applied through a rigid edge beam connected to the core only and where the loads are applied through a rigid edge structure attached to both the face sheets and core causing uniform end shortening. The post-wrinkling behavior is also considered to prove that the initial pattern of wrinkles is not affected.

Keywords: sandwich panels, wrinkling, buckling, functionally graded materials

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