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Free Vibration of Functionally Graded Smart Beams Based on the First Order Shear Deformation Theory

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Abstract : This paper studies free vibration of simply supported functionally graded beams with piezoelectric layers based on the first order shear deformation theory. The Young's modulus of beam is assumed to be graded continuously across the beam thickness. The governing equation is established. Resulting equation is solved using the Euler's equation. The effects of the constituent volume fractions, the influences of applied voltage on the vibration frequency are presented. To investigate the accuracy of the present analysis, a compression study is carried out with a known data.

Keywords : mechanical buckling, functionally graded beam, first order shear deformation theory, free vibration
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