# Abstract

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This study presents an analytical solution for the static analysis of advanced composite plates so-called (functionally graded plates: FGM) using a simple refined theory of high-order trigonometric shear deformation in which the thickness stretching effect is included. The properties of the plate are assumed to vary gradually in the thickness direction according to the exponential distribution law (E-FGM). The proposed theory gives a trigonometric description of the shear stress across the thickness and satisfies the free transverse shear stress conditions on the top and bottom surfaces of the plate. The equilibrium equations and boundary conditions of the E-FGM plates are derived using the principle of virtual work. A Navier type solution is obtained for E-FGM plates under sinusoidal load for boundary conditions that are simply supported. The results obtained from displacements and stresses for plates with different geometric configurations are presented. In order to confirm the accuracy and effectiveness of this theory, the numerical results are compared to the exact 3D solution and with other high-order shear deformation theories, and the superiority of this theory can be noted.

**Mots clés:** E-FGM plates; Statique analysis; Stretching effet; Principe of virtual work.