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Three-Dimensional Transient Thermoelastic Analysis of Orthotropic Functionally Graded Rectangular Plate

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This paper is concerned with the transient thermoelastic analysis of an orthotropic functionally graded rectangular plate due to nonuniform heat supply. The thermal and thermoelastic constants of the orthotropic rectangular plate are assumed to vary exponentially in the thickness direction. The transient three-dimensional temperature is analyzed by the methods of Laplace and finite cosine transformations. We obtain the exact solution for the three-dimensional transient thermoelasticity of a simple supported orthotropic functionally graded rectangular plate. Some numerical results for the temperature change, the displacement and thermal stress distributions in a transient state are shown in figures. Furthermore, the effects of the nonhomogeneity and orthotropy of the material on the temperature change, the displacement and the stress distributions are investigated.

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