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Three-dimensional analysis of transient thermal stresses in functionally graded plates.

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The authors analyse 3D transient heat conduction problem for a rectangular simply supported functionally graded (FG) plate with uniform temperature prescribed at the edges and subjected to either time-dependent temperature or heat flux on the top and the bottom surfaces. The material properties are taken to be analytical functions of the thickness coordinate, and are uniform in other two directions. Transient stresses developed by the resulting temperature gradients have been evaluated for a simply supported FG plate. It is found for the case of rapid time-dependent prescribed surface temperature, that the transient longitudinal stress is nearly 8 (eight) times its steady state value. The Laplace transform is employed to reduce equations governing the transient heat conduction to an ordinary differential equation in the thickness coordinate, which is then solved by power series method.

Reviewer: [Messoud A. Efendiev \(Berlin\)](#)

MSC:

[74K20](#) Plates
[74F05](#) Thermal effects in solid mechanics
[74E05](#) Inhomogeneity in solid mechanics
[80A20](#) Heat and mass transfer, heat flow (MSC2010)

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[power series method](#); [Laplace transform](#)

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