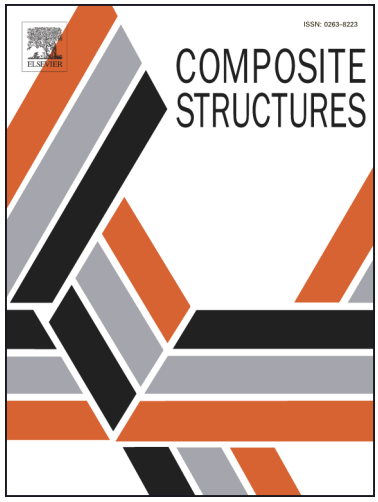


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# Multiobjective optimization of ceramic-metal functionally graded plates using a higher order model

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## ABSTRACT

A methodology of multiobjective design optimization of ceramic–metal composite plates with functionally graded materials, with properties varying through the thickness direction, obtained by an adequate variation of volume fractions of the constituent materials, is presented in this paper. Constrained optimization is conducted for different behaviour objectives like the maximization of buckling load or fundamental natural frequency. Mass minimization and material cost minimization are also considered. The optimization problems are constrained by stress based failure criteria and other structural response constraints or manufacturing limitations. The design variables are the index of the power-law distribution in the metal-ceramic graded material and the thicknesses of the graded material and/or the metal and ceramic faces.

An equivalent single layer finite element plate model having a displacement field based on a higher order shear deformation theory, accounting for the temperature dependency of the material properties, was developed and validated for the analysis of through-the-thickness ceramic-metal functionally graded plates. The optimization problems are solved with two direct search derivative-free algorithms: GLODS (Global and Local Optimization using Direct Search) and DMS (Direct MultiSearch). DMS, the multiobjective optimization solver, is started from a set of local minimizers which are initially determined by the global optimizer algorithm GLODS for each one of the objective functions.