SM10L_12665

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Topology Optimization Applied to the Design of Functionally Graded Material (FGM) Structures

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Functionally Graded Materials (FGMs) possess continuously graded properties with gradual change in microstructure. The concept of FGM is closely related to the topology optimization concept which essentially consists in a design method that seeks a continuum optimum material distribution in a design domain. This suggests that FGM structures can be designed by using topology optimization method. Thus, in this work topology optimization method is applied to design FGM structures considering a minimum compliance design problem. The topology optimization formulation considers the so-called continuous topology optimization formulation where a continuous change of the material properties is considered inside the design. As example, a new design was obtained where the design is considered in a FGM domain, that is, a domain where the properties change in a certain direction in according to a specified law, allowing us to obtain a structure with asymmetric stiffness properties. In addition, the design of FGM layered structures is also considered.

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