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MANUFACTURING CONSTRAINTS IN TOPOLOGY OPTIMIZATION OF FUNCTIONALLY GRADED MATERIALS AND STRUCTURES

Sylvia R. M. de Almeida[1], *Glaucio H. Paulino[2] and Emilio C. N. Silva[3]

[1] Federal University of Goias
Escola de Engenharia Civil da UFG, Praça Universitária, s/n, Setor Universitario, Goiania, GO, 74605-220, Brasil
sylvia@eec,ufg,br

[2] University of Illinois at Urbana-Champaign
Newmark Laboratory, 205 North Mathews Avenue, Urbana, IL 61801, USA
paulino@uiuc.edu

[3] University of São Paulo
Escola Politécnica da Universidade de São Paulo, Av. Professor Mello Moraes, 2231, São Paulo, SP, 05508-900, Brasil
ecnsilva@usp.br

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ABSTRACT

Manufacturing control is relevant to transition the technology of topology optimization toward industrial applications. Introduction of manufacturing constraints in the topology optimization process allows practical engineering solutions and design. Manufacturing control is especially important when advanced materials are involved, such as functionally graded materials or FGMs. This work presents a continuous topology optimization formulation including manufacturing constraints and material gradation effects at both global and local levels. The FGM-SIMP (Solid Isotropic Material with Penalization) model is adopted and implemented using the graded finite element concept. In particular, constraints associated to pattern repetition are applied considering material gradation either on the global structure or over the specific pattern.

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