11th World Congress on Structural and Multidisciplinary Optimisation
07th -12th, June 2015, Sydney Australia

MIST Topology Optimization for Bending Plates-Statically

M. Alfouneh[1], L. Tong[2]

[1]University of Sydney, NSW, Australia, mahmoud.alfouneh@sydney.edu.au

[2]University of Sydney, NSW, Australia, liyong.tong@sydney.edu.au

Abstract

At this article, MIST (moving iso surface threshold) topology optimization method is extended and applied for bending plates. Initially, design domain is discretized in finite element space and problem is solved by importing element densities into FEM model by using commercial software. Recalled results normalized and filtered by a heuristic filtering scheme. In this case the design domain can be one or multi-layer plate. For one layer bending plate which is under statically loading, optimized shapes based on different optimization problems such as minimum mean compliance; maximizing mutual strain energy and fully stressed design are obtained. The effect of changing boundary conditions, geometries and optimization variables on MIST topology optimization is studied and for every case of changings, optimal shapes are derived. In addition, topology optimization by MIST method is extended for treating topology optimization of multi-layer bending plates. For a laminated plate that has one or two or many solid layers as well void layers and also every layer can have different material properties, material threshold and thickness, optimal shapes for void layers (design layers) are resulted. Like one layer plate, optimization problems are the same as one layer plate. It is noteworthy that the arrangement of void and solid layers doesn't matter and can be consecutively or alternatively. The optimization is done in such a way for every iteration we have optimal shape for every layer which it means, optimization for void layers are done simultaneously. Numerical results are presented and the results show a good performance and ability of using MIST method for bending plates; one layer and multi-layer.