EngOpt2018 - 6th International Conference on Engineering Optimization
Instituto Superior Técnico, Lisbon Portugal • 17-19 September, 2018
Editors: H.C. Rodrigues, J. Herskovits, C.M. Mota Soares, et al.

Abstract ID 1093

STRESS CONSTRAINED OPTIMIZATION OF PLATES WITH NONLINEAR MATERIAL BEHAVIOUR

Bence Balogh[(1)], Matteo Bruggi[(2)], Janos Logo[(3)]

[(1)]Budapest University of Technolgy and Economics, Hungary
balogh.bence@epito.bme.hu

[(2)]Politecnico di Milano, Italy
matteo.bruggi@polimi.it

[(3)]Budapest University of Technology and Economics, Hungary
logo.janos.bme@gmail.com

Keywords: stress,constraint,EFG,FEM,nonlinear material,plate,shell,optimization

Abstract: The goal of the study is to develop numerical algorithms for the optimization of plated structures. The formulation of the optimization problem is based on the global or local weak form of a 2D continuum, giving rise to the usage of either the finite element method or another. The results are illustrated by the application of FEM and the element free Galerkin (EFG) method. In the latter, the moving least squares (MLS) method is used to construct shape functions with compactly supported weight functions, to achieve meshless approximations of system state equations. The direct method is included to enforce the essential boundary conditions because of the lack of the Kronecker delta function property of MLS meshless shape functions. Methods are compared in terms of computational time, numerical issues, advantages and shortcomings, and overall applicability in general. From optimization point of view, the goal is to minimize the volume, while ensuring a certain level of stiffness and stresses. The solution is obtained by using both the homogenization method and mathematical programming. The study is enclosed by illustrative examples of isotropic plates with linear and nonlinear material behaviour.