

Article Abstract

Title:	Cellular automata in topology optimization of continuum structures
Author(s):	E. Sanaei ^{1*} , M. Babaei ²
Address(es):	^{1*} Department of Civil Engineering, Iran University of Science and Technology, IRAN ² Department of Civil Engineering, Iran University of Science and Technology, IRAN *Corresponding Author: e-mail: sanaei@iust.ac.ir, Tel +98-21-77451501, Fax +98-21-77451502
Journal:	<i>International Journal of Engineering, Science and Technology</i> , Vol. 3, No. 4, 2011, pp. 27-41.
Abstract:	In this paper, an optimization algorithm based on cellular automata (CA) is developed for topology optimization of continuum structures with shear and flexural behavior. The design domain is divided into small triangle elements and each cell is considered as a finite element. The stress analysis is performed by the Constant Strain Triangles (CST) finite elements method. The thicknesses of the individual cells are taken as the design variables, while the weight of the structure and the ratio of the Von Mises equivalent stress to the yield stress in each cell are considered as the two objective functions to minimize. Using the weighted sum method, the multi-objective optimization problem (MOOP) is converted to the single-objective optimization problem (SOOP) and then the optimization problem is solved by the developed method. The paper reports the results of several design experiments, comparing with the existing reported results.
Keywords:	Continuum Structures, Cellular Automaton, Topology Optimization, Finite Element.