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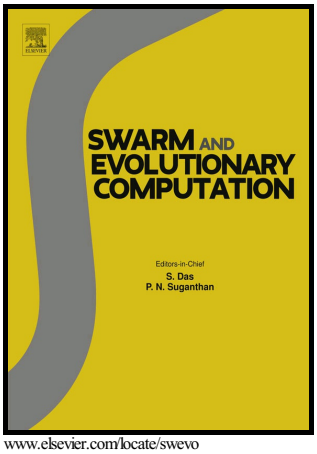

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PII: S2210-6502(17)30025-1
DOI: http://dx.doi.org/10.1016/j.swevo.2017.05.009
Reference: SWEVO279

To appear in: *Swarm and Evolutionary Computation*

Received date: 8 January 2017
Revised date: 18 May 2017
Accepted date: 24 May 2017

Cite this article as: Hirad Assimi, Ali Jamali and Nader Nariman-zadeh, Sizing and topology optimization of truss structures using genetic programming, *Swarm and Evolutionary Computation,* http://dx.doi.org/10.1016/j.swevo.2017.05.009

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Abstract

This paper presents a genetic programming approach for simultaneous optimization of sizing and topology of truss structures. It aims to find the optimal cross-sectional areas and connectivities of the joints to achieve minimum weight in the search space. The structural optimization problem is subjected to kinematic stability, maximum allowable stress and deflection. This approach uses the variable-length representation of potential solutions in the shape of computer programs and evolves to the optimum solution. This method has the capability to identify redundant truss elements and joints in the design space. The obtained results are compared with existing popular and competent techniques in literature and its competence as a tool in the optimization problem are demonstrated in solving some benchmark examples, the proposed approach provided lighter truss structures than the available solutions reported in the literature.

Keywords: Genetic programming, Topology optimization, Sizing optimization, Truss structure

1. Introduction

Structural optimization is the act of design and developing structures to take the maximum profit of available resources. This topic has attracted a great deal of interest amongst scholars and has become a challenging and

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