

Accepted Manuscript

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PII: S1359-8368(16)31336-1

DOI: [10.1016/j.compositesb.2016.09.018](https://doi.org/10.1016/j.compositesb.2016.09.018)

Reference: JCOMB 4510

To appear in: *Composites Part B*

Received Date: 18 July 2016

Revised Date: 5 September 2016

Accepted Date: 5 September 2016

Please cite this article as: Lee S, Gan BS, Lee J, A fully automatic group selection for form-finding process of truncated tetrahedral tensegrity structures via a double-loop genetic algorithm, *Composites Part B* (2016), doi: 10.1016/j.compositesb.2016.09.018.

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A fully automatic group selection for form-finding process of truncated tetrahedral tensegrity structures via a double-loop genetic algorithm

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Abstract

Numerous studies have developed novel form-finding methods of tensegrity structures using various techniques. Previous works have been limited by the lack of a fully automatic grouping technique in the form-finding process. In this study, an advanced form-finding method of tensegrity structures using a fully automatic labeling that can specify the member types. Constraint optimization problems were then used in the form-finding processes to minimize fitness functions by using a double-loop genetic algorithm. A well-known truncated tetrahedral tensegrity is presented to demonstrate the accuracy and efficiency of the proposed method. In conclusion, a very good performance of presented method has been shown in the results.

Keywords: Tensegrity, Form-finding, Force density method, Automatic group selection, Genetic algorithm

1. Introduction

A form-finding process is a key step towards the design of tensegrity system (Tibert and Pellegrino, 2011; Motro, 2003). The form-finding method of

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