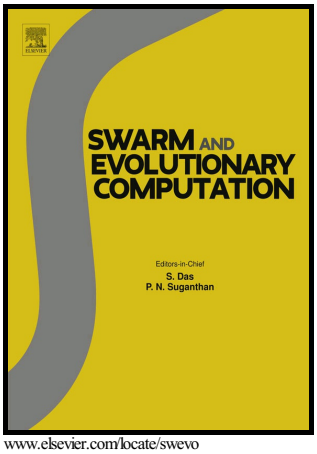
Author's Accepted Manuscript

Accelerated multi-gravitational search algorithm for size optimization of truss structures

Mohsen Khatibinia, Hessam Yazdani



www.elsevier.com/locate/swevo

PII: S2210-6502(16)30539-9
DOI: http://dx.doi.org/10.1016/j.swevo.2017.07.001
Reference: SWEVO287

To appear in: *Swarm and Evolutionary Computation*

Received date: 15 December 2016
Revised date: 2 June 2017
Accepted date: 1 July 2017

Cite this article as: Mohsen Khatibinia and Hessam Yazdani, Accelerated multi-gravitational search algorithm for size optimization of truss structures, *Swarm and Evolutionary Computation,* http://dx.doi.org/10.1016/j.swevo.2017.07.001

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Accelerated multi-gravitational search algorithm for size optimization of truss structures

Mohsen Khatibinia[a,*] and Hessam Yazdani[b]

[a] Assistant Professor, Department of Civil Engineering, University of Birjand, Birjand, Iran

[b] Assistant Professor, Department of Civil and Environmental Engineering, Howard University, Washington, DC 20059, USA

Accepted manuscript

Abstract

Weak local exploitation capability of the gravitational search algorithm (GSA) and its slow convergence rate in final iterations have been demonstrated in the literature. This paper presents a modified GSA denoted here as the accelerated multi-gravitational search algorithm (AMGSA) that exhibits an improved convergence rate. In AMGSA, the simplex crossover (SPX) and the operator mutation of the breeder genetic algorithm (BGA) are incorporated with the multi-gravitational search algorithm (MGSA) to achieve an algorithm with a good exploration-exploitation balance. MGSA is adopted to prevent stagnation of the search into a local optimum (i.e. to improve the exploration capability), while the SPX and the BGA mutation operator are used to bias the search toward promising areas of the search space (i.e. to promote local exploitation). The performance of AMGSA is evaluated using several benchmark truss optimization examples. Results indicate that AMGSA not only exhibits an improved balance between the exploration and exploitation schemes but also shows competitive promise in effectively and efficiently solving large-scale optimization problems as it requires a significantly lower number of structural analyses compared to other algorithms that it is checked against.

Keywords: size optimization; truss structures; gravitational search algorithm; simplex crossover; breeder genetic algorithm.

* Corresponding author. E-mail: m.khatibinia@birjand.ac.ir; Phone: +98 56 32220552

Download English Version:

https://daneshyari.com/en/article/6903174

Download Persian Version:

https://daneshyari.com/article/6903174

Daneshyari.com