

عنوان مقاله:

DESIGN AND APPLICATION OF A HYBRID META-HEURISTIC OPTIMIZATION ALGORITHM BASED ON THE COMBINATION OF PSO, GSA, GWO AND CELLULAR AUTOMATION

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نویسندگان:

F. Biabani
A. Razzazi
S. Shojaee
S. Hamzehei-Javaran

خلاصه مقاله:

Presently, the introduction of intelligent models to optimize structural problems has become an important issue in civil engineering and almost all other fields of engineering. Optimization models in artificial intelligence have enabled us to provide powerful and practical solutions to structural optimization problems. In this study, a novel method for optimizing structures as well as solving structure-related problems is presented. The main purpose of this paper is to present an algorithm that addresses the major drawbacks of commonly-used algorithms including the Grey Wolf Optimization Algorithm (GWO), the Gravitational Search Algorithm (GSA), and the Particle Swarm Optimization Algorithm (PSO), and at the same time benefits from a high convergence rate. Also, another advantage of the proposed CGPGC algorithm is its considerable flexibility to solve a variety of optimization problems. To this end, we were inspired by the GSA law of gravity, the GWO's top three search factors, the PSO algorithm in calculating speed, and the cellular machine theory in the realm of population segmentation. The use of cellular neighborhood reduces the likelihood of getting caught in the local optimal trap and increases the rate of convergence to the global optimal point. Achieving reasonable results in mathematical functions (CEC ۲۰۰۵) and spatial structures (with a large number of variables) in comparison with those from GWO, GSA, PSO, and some other common heuristic algorithms shows an enhancement in the performance of the introduced method compared to the other ones.

کلمات کلیدی:

truss optimization, CGPGC, grey wolf optimizer, gravitational search algorithm, particle swarm optimization, objective function, CEC functions

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