

Lee, Kang Seok; Geem, Zong Woo

A new meta-heuristic algorithm for continuous engineering optimization: harmony search theory and practice. (English) [Zbl 1096.74042](#)

Comput. Methods Appl. Mech. Eng. 194, No. 36-38, 3902-3933 (2005).

Summary: Most engineering optimization algorithms are based on numerical linear and nonlinear programming methods that require substantial gradient information, and usually seek to improve the solution in a neighborhood of the starting point. These algorithms, however, reveal a limited approach to complicated real-world optimization problems. If there is more than one local optimum in the problem, the result may depend on the selection of initial point, and the obtained optimal solution may not necessarily be the global optimum. This paper describes a new harmony search (HS) meta-heuristic algorithm-based approach for engineering optimization problems with continuous design variables. This recently developed HS algorithm is conceptualized using the musical process of searching for a perfect state of harmony. It uses a stochastic random search instead of a gradient search, so that the derivative information is unnecessary. Various engineering optimization problems, including mathematical function minimization and structural engineering optimization problems, are presented to demonstrate the effectiveness and robustness of HS algorithm.

MSC:

[74P99](#) Optimization problems in solid mechanics

[74S99](#) Numerical and other methods in solid mechanics

Cited in **68** Documents

Keywords:

[stochastic random search](#)

Software:

[DFO](#)

Full Text: [DOI](#)

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