

عنوان مقاله:

EIGENVECTORS OF COVARIANCE MATRIX FOR OPTIMAL DESIGN OF STEEL FRAMES

محل انتشار:

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خلاصه مقاله:

In this paper, the discrete method of eigenvectors of covariance matrix has been used to weight minimization of steel frame structures. Eigenvectors of Covariance Matrix (ECM) algorithm is a robust and iterative method for solving optimization problems and is inspired by the CMA-ES method. Both of these methods use covariance matrix in the optimization process, but the covariance matrix calculation and new population generation in these two methods are completely different. At each stage of the ECM algorithm, successful distributions are identified and the covariance matrix of the successful distributions is formed. Subsequently, by the help of the principal component analysis (PCA), the scattering directions of these distributions will be achieved. The new population is generated by the combination of weighted directions that have a successful distribution and using random normal distribution. In the discrete ECM method, in case of succeeding in a certain number of cycles the step size is increased, otherwise the step size is reduced. In order to determine the efficiency of this method, three benchmark steel frames were optimized due to the resistance and displacement criteria specifications of the AISC-LRFD, and the results were compared to other optimization methods. Considerable outputs of this algorithm show that this method can handle the complex problems of optimizing discrete steel frames.

کلمات کلیدی:

.Frame Design Optimization, Discrete Optimization, Meta-Heuristic Algorithms, Eigenvectors Of Covariance Matrix

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