

Improved Multi-Objective Particle Swarm Optimization Applied to Design Problem

Authors : Kapse Swapnil, K. Shankar

Abstract : Aiming at optimizing the weight and deflection of cantilever beam subjected to maximum stress and maximum deflection, Multi-objective Particle Swarm Optimization (MOPSO) with Utopia Point based local search is implemented. Utopia point is used to govern the search towards the Pareto Optimal set. The elite candidates obtained during the iterations are stored in an archive according to non-dominated sorting and also the archive is truncated based on least crowding distance. Local search is also performed on elite candidates and the most diverse particle is selected as the global best. This method is implemented on standard test functions and it is observed that the improved algorithm gives better convergence and diversity as compared to NSGA-II in fewer iterations. Implementation on practical structural problem shows that in 5 to 6 iterations, the improved algorithm converges with better diversity as evident by the improvement of cantilever beam on an average of 0.78% and 9.28% in the weight and deflection respectively compared to NSGA-II.

Keywords : Utopia point, multi-objective particle swarm optimization, local search, cantilever beam

Conference Title : ICSO 2017 : International Conference on Structural Optimization

Conference Location : Paris, France

Conference Dates : February 23-24, 2017