Application of chaos discrete particle swarm optimization algorithm on pavement maintenance scheduling problem

Kawther Ahmed, Belal Al-Khateeb, Maher Mahmood

A B S T R A C T

Particle swarm optimization (PSO) is one of the most popular and successful optimization algorithms used for solving single objective and multi-objective optimization problems. It is found that the Multi objective particle swarm optimization (MOPSO) has ability to find the optimal solution quickly and more efficient than other optimization algorithms. In this paper, a discrete (binary) MOPSO with chaos methods is developed and applied to pavement maintenance management. The main objective of this research is to find optimal maintenance and rehabilitation plan for flexible pavement with minimum maintenance cost and maximum pavement performance. This research is the first attempt to combine the crossover operation with velocity and position with multi objective PSO algorithm. The results show that the improvements in pavement performance and cost objectives are 94.65 and 54.01% respectively, while the improvement in execution time is 99.9%. In addition, it is found that the developed algorithm is able to converge to the optimal solution quickly, comparing with another PSO algorithm.