

Series-Parallel Systems Reliability Optimization Using Genetic Algorithm and Statistical Analysis

Authors : Essa Abraham Abdulgader Saleem, Thien-My Dao

Abstract : The main objective of this paper is to optimize series-parallel system reliability using Genetic Algorithm (GA) and statistical analysis; considering system reliability constraints which involve the redundant numbers of selected components, total cost, and total weight. To perform this work, firstly the mathematical model which maximizes system reliability subject to maximum system cost and maximum system weight constraints is presented; secondly, a statistical analysis is used to optimize GA parameters, and thirdly GA is used to optimize series-parallel systems reliability. The objective is to determine the strategy choosing the redundancy level for each subsystem to maximize the overall system reliability subject to total cost and total weight constraints. Finally, the series-parallel system case study reliability optimization results are showed, and comparisons with the other previous results are presented to demonstrate the performance of our GA.

Keywords : reliability, optimization, meta-heuristic, genetic algorithm, redundancy

Conference Title : ICMOIME 2017 : International Conference on Manufacturing, Optimization, Industrial and Material Engineering

Conference Location : Berlin, Germany

Conference Dates : May 21-22, 2017