

A Novel Meta-Heuristic Algorithm Based on Cloud Theory for Redundancy Allocation Problem under Realistic Condition

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Abstract : Redundancy Allocation Problem (RAP) is a well-known mathematical problem for modeling series-parallel systems. It is a combinatorial optimization problem which focuses on determining an optimal assignment of components in a system design. In this paper, to be more practical, we have considered the problem of redundancy allocation of series system with interval valued reliability of components. Therefore, during the search process, the reliabilities of the components are considered as a stochastic variable with a lower and upper bounds. In order to optimize the problem, we proposed a simulated annealing based on cloud theory (CBSAA). Also, the Monte Carlo simulation (MCS) is embedded to the CBSAA to handle the random variable components' reliability. This novel approach has been investigated by numerical examples and the experimental results have shown that the CBSAA combining MCS is an efficient tool to solve the RAP of systems with interval-valued component reliabilities.

Keywords : redundancy allocation problem, simulated annealing, cloud theory, monte carlo simulation

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