

## Reliability Optimization for a Mixed Series-Parallel System under Resource Constraints

성창섭 ( KAIST 산업공학과 )

조용권 ( KAIST 산업공학과 )

This study deals with a redundancy optimization problem for a mixed series-parallel system where a variety of different types of components are used in each stage of the system so as to incorporate a multi-choice constraint. The objective is to maximize the system reliability subject to various constraints concerned with cost, weight, and volume.

For the problem, a heuristic algorithm is suggested to find a near-optimal solution efficiently. The algorithm is exploited on the basis of decision process for adding or not each individual component additionally at an appropriate stage of the system. Such a decision is made by considering the decision associated resource contribution to the system reliability measured as relative increment in system reliability vs maximum relative increment in resource consumption. Various numerical tests performed for the efficiency and effectiveness of the algorithm are presented to show that the algorithm gives near-optimal solutions to many smaller problems. Some special instances of the problem are also discussed to find their optimal solution without using the heuristic algorithm.

The result of the paper may practically be applied to designing some manufacturing and communication systems.