

عنوان مقاله:

Optimal Multi-Level Redundancy Allocation Using a New Modified Bat Algorithm

محل انتشار:

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خلاصه مقاله:

One of the most important steps to design an engineering system is reliability allocation. Often, redundancy is used to achieve a highly reliable system. The redundancy allocation problem (RAP) is increasingly becoming an important tool in the initial stages of or prior to the plan, design, and control of systems. The multi-level redundancy allocation problem (MLRAP) is an extension of the traditional RAP such that all available items for redundancy (system, module, and component) can be simultaneously chosen. Although RAP has been considered by several researchers, MLRAP attracts only a little attention. Ordinarily, reliability uncertainty is ignored too. In this paper, this subject is studied and a new method to solve MLRAP is developed. The total cost is considered the most important constraint. A new meta-heuristic optimization algorithm, called Modified bat algorithm (MBA), to solve the constrained optimization problem (MLRAP) is proposed. This method is based on the Bat behavior to detect a prey. To demonstrate this method's capability, MLRAP for a system is described. The results are comprised with HGA, MA, and two-dimensional arrays encoding and a hybrid genetic algorithm (TDA-HGA). For this system, optimal results are the same as TDA-HGA and better than HGA and MA in all cases. Also, the reliability uncertainty and its influence on reliability allocation are studied. The optimal result is changed when uncertainty is considered. The proposed method is a simple and powerful .tool to determine the optimal multi-level redundancy allocation and reliability uncertainty modeling

کلمات کلیدی:

Modified Bat algorithm, Reliability Allocation, Redundancy allocation, Multi-level systems, Uncertainty

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