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Desirability based design of space structures using soft-computing

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Abstract

Engineering design usually requires considering multiple variances in a design and integrating them appropriately in order to achieve the most desirable alternative. This consideration takes particular importance in the constructional projects of civil engineering. However, frequently, the structural designer's considerations in civil engineering teams contrast the stylish and creative novelties of architectures. Then, we should take up new methodologies to yield appropriate alternatives which meet artistic aspects of design and simultaneously satisfy the structural designer's demands. Consequently, the process of design should incorporate the multi-fold aspects of engineer's requirements and their personal preference. So, in this study, we preset a systematic approach, so-called desirability based design, to perform a directed multi-objective optimal design considering various aspects of a design, based on soft-computing methods. Fuzzy logic integrated with genetic algorithm is employed to build a decision-making fuzzy system based on expert knowledge. It will be employed to conduct the designing process. An illustrative example show practicality of the presented methodology in structural design of space structures.

Keywords: desirability based design, fuzzy logic, space structures, engineering design, and genetic algorithm.