Optimization of constructive systems through the application of a genetic algorithm

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Abstract

Multiple design features, such as form, construction material type and thickness, and glazing type and area, affect the building's energy consumption. In this work, a procedure was developed to reduce the energy consumption of alternative building's geometries by optimizing their constructive system elements. The optimization procedure consists of a genetic algorithm that seeks to improve the opaque elements' materials types and thicknesses and transparent elements' type. The algorithm is then tested in a case study of a single-family house design program for which several floor plans were automatically created using a generative method. The performance of each candidate solution was carried out using dynamic simulation. The results shown that the developed tool was able to improve and find the near-optimum constructive system for each of the alternative building's geometry.