

Geometric Simplification Method of Building Energy Model Based on Building Performance Simulation

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Abstract : In the design stage of a new building, the energy model of this building is often required for the analysis of the performance on energy efficiency. In practice, a certain degree of geometric simplification should be done in the establishment of building energy models, since the detailed geometric features of a real building are hard to be described perfectly in most energy simulation engine, such as ESP-r, eQuest or EnergyPlus. Actually, the detailed description is not necessary when the result with extremely high accuracy is not demanded. Therefore, this paper analyzed the relationship between the error of the simulation result from building energy models and the geometric simplification of the models. Finally, the following two parameters are selected as the indices to characterize the geometric feature of in building energy simulation: the southward projected area and total side surface area of the building, Based on the parameterization method, the simplification from an arbitrary column building to a typical shape (a cuboid) building can be made for energy modeling. The result in this study indicates that this simplification would only lead to the error that is less than 7% for those buildings with the ratio of southward projection length to total perimeter of the bottom of 0.25~0.35, which can cover most situations.

Keywords : building energy model, simulation, geometric simplification, design, regression

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