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Tuning of the Thermal Capacity of an Envelope for Peak Demand Reduction

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Abstract : The thermal capacity of the envelope impacts the cooling and heating demand of a building and modulates the peak electricity demand. This paper presents the thermal capacity tuning of a building envelope to minimize peak electricity demand for space cooling. We consider a 40 m² residential testbed located in Hyderabad, India (Composite Climate). An EnergyPlus model is validated using real-time data. A Parametric simulation framework for thermal capacity tuning is created using the Honeybee plugin. Diffusivity, Thickness, layer position, orientation and fenestration size of the exterior envelope are parametrized considering a five-layered wall system. A total of 1824 parametric runs are performed and the optimum wall configuration leading to minimum peak cooling demand is presented.

Keywords : thermal capacity, tuning, peak demand reduction, parametric analysis
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