Studies on the Typical Weather Database for Building Thermal Environmental Analyses and Equipment Design in China

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Weather data are indispensable to perform building energy analyses and equipment design. In China, however, weather data for building simulations have not been developed until recently. As a result, it has been difficult to simulate building environment and hourly air-conditioning load of buildings remains unclear.

In this study, the author divides China into seven regions based on heating and cooling degree-days, clarifying the regional potential of passive heating and cooling. Weather database has been developed for building simulations and air-conditioning design. This database includes the typical meteorological year (TMY), the typical meteorological day and weather data for air-conditioning design. Using this database, the influence of climate change on air-conditioning load is analyzed. Models to predict hourly and monthly solar radiation have been developed, and the distribution of solar radiation in China is clarified. A model to separate the global radiation into direct and diffuse radiation is developed using Gompertz Function, which is more precise comparing with other models. Furthermore, energy consumption in residential houses in China is made clear and a model to predict energy consumption is established.

The database developed in this study was used in drawing up several design standards for energy efficiency of residential buildings in China.