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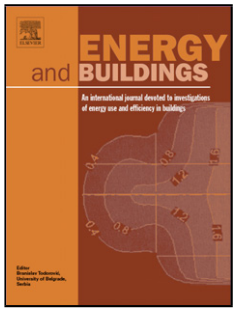

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Simplified analysis methods for thermal responsive performance of passive solar house in cold area of China

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Abstract:

Since the first Chinese passive solar house was built in 1977, a large number of passive solar houses have been built within 20 years. However, many problems appeared during the long-term utilization process, such as poor heating effect, inconvenient operation control and incomplete design standards, which lead to the development of passive solar houses stagnant in the past decade. To solve the above-mentioned problems, technical improvement and free running temperature prediction methods of passive solar house were investigated in this study. As a case study, a two-year experiment was undertaken in an improved passive solar house, located in Dalian city, northeast China, and the performance of solar air collector was investigated in winter mainly. The experimental results showed the indoor-outdoor temperature differences were about 13.4 ºC ~24.5 ºC without auxiliary heat exchanger. According to the function of useful heat gain and solar irradiance obtained through regression analyses of experimental data, a simple free running temperature prediction formula of passive solar house for engineering application

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