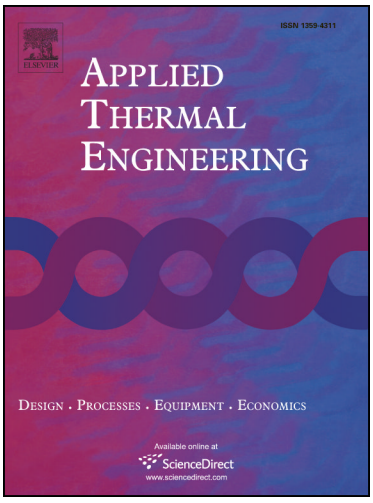

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Comparative analysis on thermal performance of different wall insulation forms under the air-conditioning intermittent operation in summer

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Highlights

- Air-conditioning intermittent operation is more suitable with the occupant's daily habits;
- Interior thermal insulation wall has the higher dynamic thermal response performance;
- Interior thermal insulation wall has the higher energy-saving potential;
- A short stop of air-conditioning does not reduce the cooling load after a long operation time;

Abstract Air-conditioning intermittent operation is widely applied in building daily management, but more attention is focused on the air-conditioning continuous operation to simplify the energy-saving design. And the air-conditioning operation difference between the daily use and the energy-saving design must lead to large discrepancies in the energy efficiency and energy consumption between the actual usage and the primary design. Taking into account this situation, a verified numerical simulation was carried on to comparatively analyze the thermal performance of different wall insulation forms under air-conditioning intermittent and continuous operation in summer. The numerical results showed that the different wall insulation forms had a remarkable effect on the temperature response rate and the heat flow of the inner surface under the air-conditioning intermittent operation, although they had the same heat transfer coefficients. The interior insulation was more suitable for the wall insulation form under air-conditioning intermittent operation, while the heavyweight self-insulation and exterior insulation were more suitable under air-conditioning continuous operation. Compared with the air-conditioning continuous operation, the daily cooling load formed by walls was reduced by 44%~55% under the intermittent operation and the interior insulation wall had the highest energy conservation rate of 52%~65%, which was 7%~19% higher than other wall insulation forms. If air-conditioning had operated for a long time,