

Solving the Overheating on the Top Floor of Energy Efficient Houses: The Envelope Improvement

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Abstract : Although various energy rating schemes and compulsory building codes are using around the world, there are increasing reports on overheating in energy efficient dwellings. Given that the cooling demand of buildings is rising globally because of the climate change, it is more likely that the overheating issue will be observed more. This paper studied the summer indoor temperature in eight air-conditioned multi-level houses in Adelaide which have complied with the Australian Nationwide Houses Energy Rating Scheme (NatHERS) minimum energy performance of 7.5 stars. Through monitored temperature, this study explores that overheating is experienced on 75.5% of top floors during cooling periods while the air-conditioners were running. This paper found that the energy efficiency regulations have significantly improved thermal comfort in low floors, but not on top floors, and the energy-efficient house is not necessarily adapted with the air temperature fluctuations particularly on top floors. Based on the results, this study suggests that the envelope of top floors for multi-level houses in South Australian context need new criteria to make the top floor more heat resistance in order to: preventing the overheating, reducing the summer peak electricity demand and providing thermal comfort. Some methods are used to improve the envelope of the eight case studies. The results demonstrate that improving roofs was the most effective part of the top floors envelope in terms of reducing the overheating.

Keywords : building code, climate change, energy-efficient building, energy rating, overheating, thermal comfort

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