

Assessment of Air well Performance in Single-storey Terraced Houses

ABSTRACT

Single-storey terraced housing in Malaysia does not provide thermal comfort to its occupants due to poor dissipation of heat from solar irradiation unless mechanical cooling is installed, which adds to the urban heating island problem. This study is a simple assessment of natural ventilation performance of terrace houses which by law are built with an air well and sized according to regulations. A typical room of 3 m x 4 m x 3 m with an adjacent air well has been investigated by CFD simulation assuming ambient temperature of 30°C and atmospheric pressure of 101.3 kPa. The results show that with an air well-chimney of 2.55 m above the roof the test room air velocity could reach 0.6 ms⁻¹ for thermal comfort; while without the protruded chimney adverse cold inflow set in, and the indoor air flow velocity ranged from as low as 0.08 ms⁻¹ to 0.21 ms⁻¹. However, when the protruded chimney was not installed, but with a wire mesh-based blocker of adverse cold inflow installed on the air well outlet, the indoor air flow velocity consistently reached 0.2-0.3 ms⁻¹, which was about 45% higher than that without the blocker, and was within the recommended range for thermal comfort. The wire mesh blocker of adverse cold inflow could be an option to ventilate effectively single-story terrace houses without the need of installing tall chimneys.