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The effect of ventilation on the thermal performance of an energy efficient house

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<p>An energy efficient passive solar house was designed, constructed and its natural ventilation efficiency monitored. Carbon tracer test was used to measure the ventilation efficiency of each ventilation component. Windows were found to have higher impact on the ventilation rate than doors. The correct operation of the ventilation components was found to be the main contribution factor in natural ventilation.Tracer gas tests were conducted over a period of time to measure actual air change rates. Carbon dioxide was injected into the house and its concentration monitored over time to determine how quickly the gas dissipates through the house's envelope. The west side ventilation components were used to control the indoor environment by regulating the amount of air flowing into the house. A carbon dioxide sensor was placed in the centre of the house at a height of about 0.45 m above the floor. A fan was used to pump the indoor air into the sensor at a rate of about 300 ml/min. To investigate the effects of each of the ventilation component configurations, the ventilation rate tests were done in four configurations. A carbon dioxide sensor connected to a CR1000 data logger and a computer was used to monitor carbon dioxide concentration in the house. results:The tracer gas technique was used to measure the air exchange rate. The average indoor and outdoor temperatures during these tests were, Tin = 20 ℃ and Tout =17 ℃, and an average wind speed of 0.5 m/s blowing from W(600 150)N.when both windows and doors were opens. Results indicate that the concentration decays exponentially to the background concentration within a period of 16 minutes. Assuming that the west window and door are the only paths through which the westerly winds enter the house, then the mass air flow rate through the door and window is approximated.Take the average air density to be 1.2 kg/m3, an average indoor and outdoor pressure difference to be 4 Pa. For wide-open windows and doors, the opening area is the sum of the windows and doors areas, which gives 2.06 m2 and taking the discharge coefficient Cd=0.6 the average mass airflow was found to be approximately 3.83 kg/s.Natural ventilation varies greatly on local factors such as wind speed and temperature which also influence at which occupants open ventilation components.

Level (Hons, MSc,
   PhD, other)?

msc

Consider for a student
   award (Yes / No)?

Yes

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

no

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