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Window opening behaviour modelled from measurements in Danish dwellings - DTU Orbit (09/11/2017)

Window opening behaviour modelled from measurements in Danish dwellings

A method of defining occupants' window opening behaviour patterns in simulation programs, based on measurements is proposed.Occupants' window opening behaviour has a strong effect on indoor environment and the energy consumed to sustain it. Only few models of window opening behaviour exist and these are solely based on the thermal indoor/outdoor environment. Consequently, users of simulation software are often left with little or no guidance for the modelling of occupants' window opening behaviour, resulting in potentially large discrepancies between real and simulated energy consumption and indoor environment.Measurements of occupant's window opening behaviour were conducted in 15 dwellings in Denmark during eight months. Indoor and outdoor environmental conditions were monitored in an effort to relate the behaviour of the occupants to the environmental conditions. The dwellings were categorized in four groups according to ventilation type (natural/mechanical) and ownership (owner-occupied/rented) in order to investigate common patterns of behaviour. Logistic regression was used to infer the probability of opening and closing a window.The occupants' window opening behaviour was governed by different but distinct habits in each dwelling. However, common patterns were also identified in the analysis: Indoor CO2 concentration (used as indicator of indoor air quality) and outdoor temperature were the two single most important variables in determining the window opening and closing probability, respectively.The models could be implemented into most simulation programs, which would enable a better chance of mimicking the behaviour of the occupants in the building and thus simulating the indoor environment and energy consumption correctly. © 2013 Elsevier Ltd.

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