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Abstract: Ventilation in the heat and mass balance of a building is usually the most important part of exchange of heat and material between the building and the outside. Well-done ventilation could be the key to keep a thermal comfort environment inside a building and a good indoor air quality. Therefore, efforts are made in order to improve the systems of natural and mechanical ventilation and to decrease the high levels of consumption of energy within buildings in general. An important part of this consumption is due to mechanical ventilation, or driving forces, but with natural ventilation, and with the necessary conditions like good outdoor air quality, low levels of outdoor noise etc, it is possible to reduce the consumption of this type of ventilation, ensuring thermal and indoor air quality levels of comfort.

To determine whether a building is well ventilated or not, an algorithm that evaluates natural ventilation of a building is proposed. This is done by coupling multizone airflow equations (a multizone airflow model) with a thermal building simulation program, firstly taking into account deterministic and then stochastic inputs like external air temperature, wind velocity, wind direction, number of occupants in the building, their schedules etc. Because it is not possible to predict the deterministic behaviour of the outdoor wind and its flow inside the construction, a stochastic model of simulation is proposed in order to get distributions of outputs which help to know the natural ventilation capacity, among other things. These kinds of distributions could be indoor air temperature, relative humidity of indoor air, volume flow rate, mass flow rate, indoor air quality etc. With this information, and with different international standards of ventilation (ASHRAE, OSHA, DS/EN Standards, NOM-008-ENER, etc) it is possible to know if the building is well ventilated or not, independently of the building's location. If the building is not well ventilated, one can go back to the initial inputs and change some characteristics of the construction or activities of the occupants, then evaluate it again and check the results. This kind of study is oriented to design of new buildings, but it could also be used in already constructed buildings.

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