

Abstract

This research studies the efficiency and possibility of using natural ventilation in single houses, analyzed by a computational fluid dynamics program. Factors that include the type of ventilation and the ratio of opening area to functional floor area derive from the survey of houses in Bangkok. The results can be concluded in terms of air speed that affects thermal comfort in the houses. The process consists of 1) the study of natural ventilation efficiency from the 11-year average weather data of Bangkok and 2) the study of the types of natural ventilation in single houses. Firstly, it is found that Thai climate can have 43 percent of comfort hours. Secondly, two types of functional areas are found including 16 square-meter rooms that have one-side and two-side ventilation and 32 square-meter rooms that have two-side, three-side, and cross ventilation. The opening area is found to be between 10 to 25 percent of the functional floor area. The experimental results show that 1) the most effective case is cross ventilation while one-side ventilation provides lowest air velocity 2) increasing the opening to functional floor area ratio generally increases the air speed in the room but the ratio of 20 percent is the best for 32 square-meter rectangular room and 3) inlets that are smaller than outlets can increase the air velocity in the room because of the Venturi effect. The findings of this research can define a method for natural ventilation evaluation, which is tested with various types of single houses. Moreover, design guidelines and natural ventilation prediction charts for single houses are also created.