Effect of Inlet Airflow Variables on Internal Natural Air Velocity as a Tool for Reducing Infection with COVID-19

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Abstract:

Coronavirus (**COVID-19**) has affected day to day human lifestyle and also is slowing down the global economy of all countries. This pandemic has affected thousands of people, who are either sick, sitting in hospitals or are being killed due to the spread of this disease. This viral infection has forced people to stay at home most of the time, and do the majority of life requirements from home, such as work, education, shopping, etc. and hence nowadays, the main task for architects is to improve the quality of environment inside different architectural spaces for helping the users to do their needs and from other side for protecting them from this virus.

Achieving natural ventilation is one of the most important tools, which helps improving the air quality and hence providing healthy spaces for reducing the viral infection. Good designing of the air inlet is playing the main role of achieving the mentioned healthy environment. This paper, therefore, presents a detailed evaluation of the impact of the inlet openings variables on the ventilation performance of a single-zone isolated building. The evaluation is based on the induced airflow velocity.

High-resolution coupled 3D steady Autodesk CFD simulations of cross-ventilation are performed for shape (rectangular and square shape); building slop angle (0, 15, 30,45,60,75 and 90 degree); Wall to Floor Ratio (WFR) (10, 15, 20%) and Wall to Wall Ratio (WWR) (20, 25, 30%) of inlet openings.

The results show that using rectangular window shape coupled with building slop 0 degree and WWR 30% represent the maximum ventilation ratio inside a building, while
the square window shape represents an air flow ratio less than the rectangulr shape for
the same
window area, building slop degree, WFR and WWR. Additionally, the window shape effect on the variation in the airflow ratio of buildings with slope angel bigger than or equal 60 degrees, is too small that it can be ignored.

Keywords:

COVID-19; Natural Ventilation; Inlet variables; CFD Simulation

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