Abstract

In the present study, an analytical solution for transient airflow process across three vertical vents induced by stack-driven effect in un-stratified cross-ventilated rectangular building with an opposing flow in one of the upper opening was presented. An approximation of reduced gravity is taken into account in order to maintain thermal buoyancy effect. One-dimensional Navier-Stokes Equations is utilized to model the airflow process in the building. Variation of parameter and separation of variable methods were employed to obtain the possible solutions of the model equations. The solutions predict the following; velocity- and temperature profiles together with volumetric airflow and mass transfer which evaluated numerically for several sets of values of effective thermal coefficient (


**Index Terms**

Computer Science  
Information Sciences

**Keywords**

Velocity profiles; Temperature profiles; volumetric airflow; Mass transfer