

Optimization of Geometry on Trombe Wall to Transmit Excessive Heat

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Abstract:

In this paper, a free heat movement model in a room affected by Trombe wall three-dimensionally for laminar and turbulent flows was simulated by Fluent numerically model and the optimized air channel geometry for optimal temperature was obtained. In order to predict effects resulting from direct radiation, solar ray tracing algorithm, modeled by using solar positioning vector and radiation parameters and the results were compared with those of experimental models to select the appropriate model. Using this model, the optimized geometry of Trombe wall was selected to transmit maximum heat in a range of Rayleigh values from 107 to 1010 with the help of Nusselt values. The result indicate that the low Reynolds shear stress model was a superior model as a turbulence model. Also, they indicated that the geometrical parameters including heat wall distance from glass, wall thickness and upper and lower channels area decrease by Rayleigh number.

Keywords: Optimization, Trombe wall, Free convection, Building heating, Numerical simulation.