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Abstract

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VERIFICATION OF A NUMERICAL SIMULATION TECHNIQUE FOR NATURAL CONVECTION*

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ABSTRACT

Natural convective heat transfer plays a significant role in both passive and conventional buildings. One of the areas of primary interest to passive heating and cooling technology is convection within a single zone where the air temperature distribution and heat gain or loss from exposed thermal storage mass and other solid surfaces is determined by the convective flows. In spite of its many energy and health impacts, little research attention has been given to convection in buildings until recently.

A computer program (CONVEC2) has been developed which numerically simulates two-dimensional natural convection in rectangular enclosures at Rayleigh numbers of the order of 10^{10}. In order to verify the computer program, its predictions are compared with data from a single-zone, small-scale experiment recently reported in the literature. Comparisons are presented for (1) heat transfer rates, (2) fluid temperature profiles, (3) flow visualizations, and (4) surface heat flux distributions.

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