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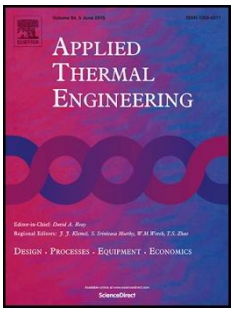

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ENHANCEMENT OF HEAT TRANSFER OF CONFINED ENCLOSURES WITH FREE CONVECTION USING BLOCKS WITH PSO ALGORITHM

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Abstract

In this paper, optimal shape of cavity with change of hot walls geometry is obtained using PSO algorithm. In this method near domain of hot wall is divided to similar blocks as those can be solid or fluid. Free convection is dominant in the cavity. Continuity, momentum and energy equations are discretized by finite volume method. These equations are solved by Simple algorithm. PSO algorithm is used for obtaining diffusion terms near the hot walls. These parameters are set in governing equations as exit heat fluxes from cold walls to be maximized. The results are obtained for range of Rayleigh numbers and different boundary conditions. Results show PSOA is able to obtain size and location of changes in hot walls. These changes can be increase heat transfer from cold wall between 13%-40% for different boundary conditions. If hot and cold walls are near together, millimeter changes are enough for acceptable percent value of increase of heat transfer but for cases that hot wall is far from cold wall we must be attached medium or large thin plates on hot wall or construct new cavities accordance with optimized shape obtained from PSO algorithm. As told this method is capable to apply to constructed cavities with attachment of rectangular fins.

Kywords: free convection, optimized shape, PSO algorithm