

Entropy Production in Mixed Convection in a Horizontal Porous Channel Using Darcy-Brinkman Formulation

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Abstract : The paper reports a numerical investigation of the entropy generation analysis due to mixed convection in laminar flow through a channel filled with porous media. The second law of thermodynamics is applied to investigate the entropy generation rate. The Darcy-Brinkman Model is employed. The entropy generation due to heat transfer and friction dissipations has been determined in mixed convection by solving numerically the continuity, momentum and energy equations, using a control volume finite element method. The effects of Darcy number, modified Brinkman number and the Rayleigh number on averaged entropy generation and averaged Nusselt number are investigated. The Rayleigh number varied between $103 \leq Ra \leq 105$ and the modified Brinkman number ranges between $10^{-5} \leq Br \leq 10^{-1}$ with fixed values of porosity and Reynolds number at 0.5 and 10 respectively. The Darcy number varied between $10^{-6} \leq Da \leq 10$.

Keywords : entropy generation, porous media, heat transfer, mixed convection, numerical methods, darcy, brinkman

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