

Entropy Generation of Natural Convection Heat Transfer in a Square Cavity Using Al₂O₃-Water Nanofluid

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Abstract : Entropy generation of an Al₂O₃-water nanofluid due to heat transfer and fluid friction irreversibility has been investigated in a square cavity subject to different side wall temperatures using a nanofluid for natural convection flow. This study has been carried out for the pertinent parameters in the following ranges: Rayleigh number between 10⁴ to 10⁷ and volume fraction between 0 to 0.05. Based on the obtained dimensionless velocity and temperature values, the distributions of local entropy generation, average entropy generation and average Bejan number are determined. The results are compared for a pure fluid and a nanofluid. It is totally found that the heat transfer and entropy generation of the nanofluid is more than the pure fluid and minimum entropy generation and Nusselt number occur in the pure fluid at any Rayleigh number. Results depict that the addition of nanoparticles to the pure fluid has more effect on the entropy generation as the Rayleigh number goes up.

Keywords : entropy generation, natural convection, bejan number, nuselt number, nanofluid

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