Studying The Thermal Performance In A Magnetized Flow Of Ag-MgO Nano Fluid In A Horizontal Channel Contain Rotating Cylinder

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Received: December 13, 2023; Accepted: June 05, 2024

The study included mixed heat convection in a horizontal duct with a triangular enclosure attached to the bottom wall, and this enclosure contained a rotary cylinder with radius R = 0.12. A water-based Ag-Mgo nano fluid containing nanoparticles was used. Two cases of hybrid convection heat transfer are discussed here. Case 1: All surfaces of the channel, cavity and cylinder surface are insulated, whereas the wall on the left of cavity is at constant temperature. Case 2: All walls surface are insulated except for the right surface of the cavity, which is exposed to the constant temperature. The governing equations have been solved using a Galerkin-based high-order finite element method for different physical parameters in a steady flow regime. Further, Reynolds number ranges (Re=10-100) are used as governing parameters, rotational speed (Ω = -25 to 25), Richardson numbers (Ri=1-30), and cylinder locations C = 0.2–0.5. Average Nusselt numbers (Nu), streamline contour maps, and isotherm contour maps illustrate the results of the current study. The findings reveal that as Re, Ω, and Ri increase, a corresponding rise in the average Nu. When Ω = - 25, the percentage improvement in the Nu was 38.56% compared with the rotational speed Ω=25. The average Nu increases with the location of the cylinder rotation. It is found that the rotation of the cylinder near the base of the cavity gives high average Nu values.

Keywords: Horizontal channel; Heat transfer; Hybrid nanofluid; Mixed flow; Rotating cylinder

http://dx.doi.org/10.6180/jase.202505_28(5).0010