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Mixed convection and entropy generation in a lid-driven cavity filled with a hybrid nanofluid and heated by a triangular solid
(2018) *Heat Transfer Research*, 49 (17), pp. 1645-1665. Cited 6 times.

Abstract
The use of a hybrid nanofluid is a new strategy of heat transfer enhancement. It is composed of more than one type of nanoparticles suspended in a base fluid. The present study investigates the mixed convection and entropy generation of a Cu-Al2O3-water hybrid nanofluid inside a lid-driven cavity heated by a triangular solid and cooled isothermally from the right vertical wall. The top wall moves in aiding or opposing directions. The studied pertinent parameters are: the thermal conductivity ratio of the triangular solid wall to the base fluid (Kr = 0.44, 1, 23.8), the Richardson number (Ri = 0.01, 1, 10), and the volume fraction of the hybrid and familiar nanofluids (φ, φCu, φAl2O3 = 0.0-5%). The Prandtl number is fixed at 6.26, and the thickness of the solid wall, at 0.5. A uniform up-wind scheme finite difference method is used for numerical solution. The results have shown that the hybrid nanofluid strategy promises in improvement of the economic aspect by reducing the quantity of high thermal conductivity nanoparticles, which usually are more expensive. © 2018 by Begell House, Inc.

2-s2.0-85053382326
Document Type: Article
Publication Stage: Final
Source: Scopus