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Tayebi, T., Chamkha, A.J.

Buoyancy-driven heat transfer enhancement in a sinusoidally heated enclosure utilizing hybrid nanofluid
(2017) *Computational Thermal Sciences*, 9 (5), pp. 405-421. Cited 8 times.

Abstract
The purpose of this work is to study numerically heat transfer and fluid flow characteristics by natural convection in an enclosure filled with Al2O3/water nanofluid and Cu-Al2O3/water hybrid nanofluid including pure water. The left sidewall of the cavity is heated by a nonuniform surface temperature, while the right wall is kept isothermally cooled. The basic equations that govern the problem (continuity, momentum, and energy) are formulated in terms of the vorticity-stream function equations using the dimensionless form for two-dimensional, laminar and incompress- ible flow under steady-state conditions. Those equations are discretized via the finite volume method and solved by a FORTRAN computer program. The thermophysical properties of the nanofluid and the hybrid nanofluid are calculated in terms of the volume fraction of nanoparticles and combined nanoparticles. A numerical study is performed for an enclosure filled with regular water, Al2O3/water nanofluid, and Cu-Al2O3/water hybrid nanofluid for various volume fractions of nanoparticles and hybrid nanoparticles ($0 \le \Phi \le 0.12$) and Rayleigh number ($103 \le Ra \le 105$). The results of the study are presented in the form of streamlines, isotherm contours, and distribution of the local and average Nusselt numbers on the heated wall. The main result we obtained is that the use of Cu-Al2O3/water hybrid nanofluid offers better thermal and dynamic performance compared to the similar Al2O3/water nanofluid. © 2017 by Begell House, Inc.

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