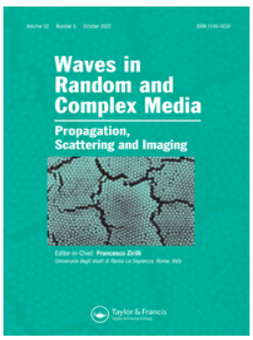

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Impact of geometric shape of cavity on heat exchange using Cu-Al_2O_3-H_2O hybrid nanofluid

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ABSTRACT

In the present work, the impact of cavity geometric shape on heat exchange is numerically studied. The Cu-Al_2O_3 water hybrid nanofluid with a solid volume fraction of 0,03 is considered in this simulation. The bottom wall of the cavity is brought to a constant hot temperature. The two vertical side walls are cooled, and the upper wall of the cavity is adiabatic.

In these conditions, four cases are studied. The first one is a rectangular cavity filled with the hybrid nanofluid, while in each case of the other three, the shape of one cavity wall is changed. The numerical results are developed for Rayleigh numbers varying from 10^3 to 10^5 and for a laminar and stationary flow regime. The governing equations are solved numerically using the finite volume method (FVM).

The results indicate that the cavity shape significantly affects the improvement of heat exchange. We found that the third case gives the best heat exchange compared to the other cases, and the increase in the value of the Rayleigh number contributes to an enhancement in heat exchange, especially in the third case. It also participates in a decrease in the temperature inside the cavity.

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KEYWORDS
Hybrid nanofluid; Rayleigh number; numerical simulation; cavity; heat exchange

Nomenclature

C_p:	specific heat of the fluid, J.kg^{-1}.K^{-1}
g:	acceleration of gravity, m.s^{-2}
Gr:	Grash of number
H:	cavity height, m
k:	thermal conductivity, W.m^{-1}.K^{-1}
L:	cavity length, m
Nu_L:	local Nusselt number
P:	pressure, Pa
Pr:	Prandtl number

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