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Abstract
The present numerical study investigates the analysis of thermodynamic irreversibility generation and the natural convection in inclined partially porous layered cavity filled with a Cu-water nanofluid. The finite difference method with up-wind scheme is used to solve the governing equations. The study is achieved by examining the effects of nanoparticle volume fraction, inclination angle, and the porous layer thickness. Besides, the computations are achieved within the laminar range of the Rayleigh number. The results show that at Ra = 104, a reduction of total entropy generation is recorded with increasing nanoparticle volume fraction when the porous layer thickness is greater than 0.2. Moreover, when Ra is less than 105, the nanoparticle volume fraction increases the heat transfer irreversibility, and improves the overall thermal performance. It is found also that for a low Rayleigh number, the largest porous layer thickness and the highest cavity orientation improve the thermal performance. On the contrary, at high Rayleigh numbers, these parameter ranges give the worst thermal performance. © 2017 Published by NRC Research Press.

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