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Abedini, A., Armaghani, T., Chamkha, A.J.

MHD free convection heat transfer of a water–Fe 3 O 4 nanofluid in a baffled C-shaped enclosure
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Abstract
In this paper, the effect of a baffle on free convection heat transfer of a water–Fe 3 O 4 nanofluid in a C-shaped enclosure in the presence of a magnetic field is investigated numerically. The enclosure is subjected to a constant magnetic field. The vertical wall on the left side is maintained at a constant hot temperature of T h , and the right one is kept at a constant cold temperature of T c . The rest of the walls are insulated. The governing equations are discretized by the control volume method and solved simultaneously by the SIMPLE algorithm. The numerical results show very good agreement with other published works. The results indicate that by increasing the enclosure's aspect ratio, the Nusselt number is increased. It is also found that the volume fraction of nanoparticles can be raised in order to achieve increased cooling in the enclosure. By increasing the aspect ratio, the effect of the nanoparticles on the enhancement of the Nusselt number is more pronounced. Also, the maximum effect of the baffle on the heat transfer is seen at the bottom of the hot wall. Generally, increasing the baffle length produces increases in the Nusselt number. The maximum cooling level is occurred for AR = 0.7 and B f = 0.2. © 2018, Akadémiai Kiadó, Budapest, Hungary.

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