

## Documents

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**Effects of two-phase nanofluid model on natural convection in a square cavity in the presence of an adiabatic inner block and magnetic field**  
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### Abstract

**Purpose:** The purpose of this paper is to study problem of conjugate MHD natural convection of Al<sub>2</sub>O<sub>3</sub>-water nanofluid in a square cavity with conductive inner block using Buongiorno's two-phase model numerically. **Design/methodology/approach:** An isothermal heater is placed on the left wall of the square cavity, while the right wall is maintained at a constant cold temperature. The horizontal top and bottom walls are kept adiabatic. The boundaries of the annulus are assumed to be impermeable, the fluid within the cavity is a water-based nanofluid having Al<sub>2</sub>O<sub>3</sub> nanoparticles. The Boussinesq approximation is applicable. The governing equations subject to the boundary conditions are solved using the finite difference method. **Findings:** Numerical results are presented graphically in the form of streamlines, isotherms and nanoparticles distributions as well as the local and average Nusselt numbers. The results show that the effect of the nanoparticles addition on the average Nusselt number is essential for low Rayleigh, high Hartmann and high values of length ratio when attenuated the convective flow. **Originality/value:** According to exist studies and to the authors' best knowledge, so far, there have been no studies of conjugate natural convection of Al<sub>2</sub>O<sub>3</sub>-water nanofluid in a square cavity with a conductive inner block using Buongiorno's two-phase model with the effect of the magnetic field. Thus, the authors believe that this work is new and valuable. The aim of this study is to investigate the MHD natural convection of Al<sub>2</sub>O<sub>3</sub>-water nanofluid in a square cavity with conductive inner block using Buongiorno's two-phase model. © 2018, Emerald Publishing Limited.

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