

عنوان مقاله:

Numerical simulation of heat transfer and fluid flow due to convection and radiation in an enclosure

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خلاصه مقاله:

This paper investigates natural convection in a two-dimensional square cavity filled with air, where the vertical walls have different temperatures and the horizontal walls are thermally insulated. The finite element method in COMSOL software is used for the numerical solution. The study covers pure natural convection with Rayleigh numbers ranging from 1 to 10⁶, and its interaction with surface radiation with emissivity from 0 to 0.6. The results are shown as isotherms, pressure, current and so on. The study reveals that for Rayleigh numbers below 10⁴, the fluid has a vertical temperature gradient due to conduction only, without any convective motion. Surface radiation does not affect the fluid dynamics equations, but only changes the thermal boundary conditions. The link between natural convection and surface radiation is through the thermal boundary conditions only. The emissivity of the walls has no impact on the temperature isotherms.

کلمات کلیدی:

Natural convection, Cavity, Convection-Radiation, Numerical simulation

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