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**A numerical study of natural convection in a square enclosure
with a circular cylinder at different temperature of bottom surface**

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The physical model considered here is a square enclosure of fluid heated below and cold above with a hot cylinder placed at the center of the square. The bottom of square enclosure has dimensionless thermal isothermals of 0 to 1.0. The immersed boundary method (IBM) to model an inner circular cylinder based on finite volume method (FVM) is used to study for different Rayleigh numbers varying over the range of $10^3 \sim 10^6$. The dimensionless temperature of the bottom wall is changed along the hot cylinder located the center of the square. This study investigates the effects of the temperature of bottom wall and the buoyancy-induced convection on heat transfer and fluid flow. Detailed analysis results for the distribution of streamlines, isotherms and Nusselt number are presented in this paper.

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