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Thermal convection in an enclosure with a heat-generating porous cylinder SHIMIN YU, Southern University of Science and Technology Harbin Institute of Technology, PENG YU, Southern University of Science and Technology — In this work, a numerical simulation will be performed for flow and heat transfer in a square enclosure with a porous cylinder with internal heat generation. Considering the two-domain approach, the Darcy-Brinkman-Forchheimer extended model will be applied for the flow in the porous region, and the Navier-Stokes equation will be used to model the flow in the homogenous fluid region. To obtain a better coupling flow and heat transfer at the porous-fluid interface, a stress jump condition together with continuities of velocity and normal stress and a continuity of heat flux as well as temperature will be exerted. The finite volume method based on the body-fitted and multi-block grids will be used to solve the governing equations. The effects of the Darcy number, Rayleigh number, porosity, and the Prandtl number on the flow pattern and heat transfer will be discussed. The flow and thermal characteristics will be presented in terms of streamlines and temperature distributions. The heat transfer rate, quantified by the Nusselt number, at different physical parameters will be also investigated.

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