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Conjugate Thermal Boundaries Effect On Natural Convection Flow Structures In Enclosures TOMAS SOLANO, JUAN ORDONEZ, KOUROSH SHOELE, Florida State University — Buoyancy-induced flow for a heated sphere in a square enclosure coupled with external forced convection cooling of the enclosure walls is investigated numerically using an immersed boundary method and conjugate thermal boundary conditions. The external forced convection cooling, on the enclosure boundaries, is seen to significantly modify the internal convection recirculatory flow and thermal stratification depending on Rayleigh number and aspect ratio. The relation between the external Reynolds number and the internal Rayleigh number is reported in terms of streamlines, isotherms, local and average Nusselt numbers. Asymmetric and reversed flow is observed as the relation between external Reynolds and internal Rayleigh is changed. The coupling between the two modes of convection is presented as a means to control the convection pattern and vertical structures in an enclosure with heated components.

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