

## INTERACTION BETWEEN DOUBLE DIFFUSIVE NATURAL CONVECTION AND RADIATION IN A SQUARE ENCLOSURE WITH PARTIALLY ACTIVE VERTICAL WALL

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**ABSTRACT** A numerical study is performed to investigate the effect of surface and volume radiation on the double diffusive natural convection in a square enclosure with a partially active side wall subjected to opposite and horizontal temperature and concentration gradients. The partially active vertical left side wall and fully active vertical right side wall of the enclosure are maintained at two different but uniform temperatures and concentrations. The remaining boundaries are impermeable and thermally insulated. These walls are assumed to be opaque, diffuse and grey and the working fluid is considered as grey, absorbing, not scattering and emitting thermal radiation. The governing differential equations are solved by a finite-volume method and the SIMPLE algorithm was adopted to solve the pressure–velocity coupling. The discrete ordinates method (DOM) is used to solve the radiative transfer equation within the fluid. Three different relative positions of the active part of the left wall were considered: this parameter has a significant effect on heat and mass transfer as well as the flow structure. The effects of some other influencing parameters have been investigated too, such as the fluid opacity and the mass to thermal buoyancy ratio.

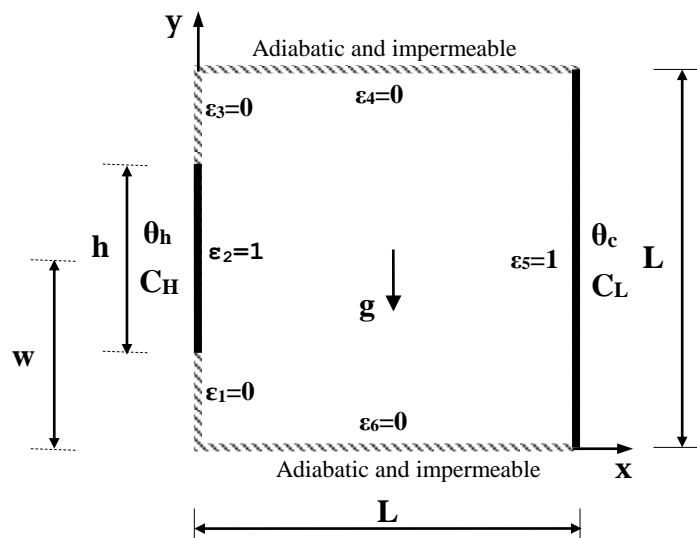


Figure 1: Physical configuration