

Natural Convection in Tall and Short Enclosures

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Abstract:

Natural convection in enclosures which transfers heat without an external power source and therefore without moving parts, is investigated numerically and experimentally for laminar and turbulent flow by several researchers due to its wide range of applications such as electronic cooling, solar energy, nuclear energy, space systems, petroleum industry, cryogenics, design of buildings, manufacturing processes, and its being responsible for oceanic thermohaline circulation and motion of the plates making up the Earth's lithosphere in mantle convection. A variety of researchers have examined ways to optimize in regard to techniques that employ natural convection fluid flow and heat transfer. The shape and orientation of the enclosure change the flow patterns formed due to natural convection, and hence affecting the convective heat transfer. Temperature and velocity distributions resulted in utilizing different numerical modeling techniques as a function of the dimensionless parameters for tall and short enclosures are presented and compared with the existing experimental data.