Proceedings of CHT-15
ICHMT International Symposium on Advances in Computational Heat Transfer
May 25-29, 2015, Rutgers University, Piscataway, USA
CHT-15-063

"NUMERICAL INVESTIGATION OF FLOW AND HEAT TRANSFER IN VERTICAL CONCENTRIC ANNULI WITH ROTATING OUTER WALL"

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ABSTRACT Numerical investigations have been conducted to study hydrodynamically developed and thermally developing mixed convection for steady incompressible laminar air flow in a vertical concentric annuli with diameter ratio (Di/Do) 0.614. The numerical setup consists of aluminium inner cylinder (Di=51mm, H=1.5m) stationary and heated, while the acrylic outer cylinder (Do=83mm, H=1.5m) rotated and insulated. Numerical simulations have been performed for rotational Reynolds numbers 260, 435, 870 and 2172 keeping the heat flux and aspect ratio (H/Do) as 80W/m^2 and 18 respectively. The selection of rotational Reynolds number range and heat flux range has been done to obtain the Richardson number (Ri) in the range 0.15 to 9.64 to cover the mixed convection regime. The mathematical model governing the problem is numerically solved in three dimensional computational domain using the commercial computational fluid dynamics package CFX available in ANSYS Work bench 14. The dependence of rotational Reynolds number and Richardson number on the flow and the heat transfer in the annulus is analysed and discussed.