Abstract

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Numerical Simulation for double diffusive mixed convection with aiding, opposing flow in vertical annular tube

The present study is concerned with the mixed convection in a vertical annular tube under the combined buoyancy effects of thermal and mass diffusion. Double-diffusive convective flow in a vertical annular tube with aiding opposing flow is studied numerically. Laminar flow and steady state condition are considered. The transport equations for continuity, momentum, energy and mass transfer are solved. The numerical procedure adopted in this analysis yields consistent performance over a wide range of parameters, Richardson number, Ri, (10-3?Ri?10) Aspect Ratio, AR, (1?AR?20) Radius ratio, Ro/Ri, (1.1?Ro/Ri?11) and Lewis number, Le, (0.1?Le?10). The numerical results are reported for the effect of the Parameters on the iso-contours of temperature, and concentration. The predicted results for both local and average Nusselt and Sherwood numbers are presented for various parametric conditions. This study was done for constant Grashof number, Gr=104 and Prandtl number, Pr=0.71, Gap Width, G=1 and Buoyancy Ratio, N=1.