

# Abstract

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## **Numerical Simulation for double diffusive mixed convection with aiding and opposing flow in vertical annulus cylinder**

The present study is concerned with the mixed convection in a vertical tube under the combined buoyancy effects of thermal and mass diffusion. Double-diffusive convective flow in a vertical annulus tube with aiding opposing flow is studied numerically. The flow laminar and under 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,  $Ri$ , ( $10^{-3} \leq Ri \leq 10$ ) Aspect Ratio,  $AR$ , ( $1 \leq AR \leq 20$ ) Radius ratio,  $Ro/Ri$ , ( $1.1 \leq Ro/Ri \leq 11$ ) ( and Lewis number,  $Le$ , ( $0.1 \leq Le \leq 10$ ). 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,  $Pr=0.71$ .