

# Abstract

**Mohamed Abd El Fatah Mohamed Teamah**

## **numerical simulation for double diffusive mixed convection with aidingopposing flow in vertical tubes**

the present study is concerned with the mixed convection in a vertical tube under the combined buoyancy effects of thermal mass diffusion. double-diffusive convective flow in a vertical tube with upward downward flow is studied numerically. the flow laminar under steady state condition are considered. the transport equations for continuity, momentum, energy mass transfer are solved. the numerical procedure adopted in this analysis yields consistent performance over a wide range of parameters, richardson number,  $ri$ , ( $10^{-2}$   $ri$   $10$ ) aspect ratio,  $ar$ , 2.5  $ar$  20 buoyancy ratio,  $n$ , ( $-10 < n < 10$ ) lewis number,  $le$ , ( $0.1 \leq le \leq 100$ ). 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 average nusselt sherwood numbers are presented for various parametric conditions. this study was done for constant grashof number,  $gr=105$  prandtl number,  $pr=0.71$ .