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Soret and Dufour effects on unsteady double diffusive natural convection in porous trapezoidal enclosures
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Abstract
This work examines the Soret and Dufour effects on the unsteady double-diffusive natural convection inside trapezoidal enclosures filled with isotropic porous medium with exponential variation of boundary conditions. The analysis uses a two-dimensional trapezoidal enclosure with the inclined walls being kept at constant cold temperature and concentration while the temperature and concentration vary exponentially on the bottom wall of the enclosure. The top wall of the trapezoidal is thermally insulated. The physical problems are represented by non-dimensional governing equations along with the corresponding boundary conditions are solved numerically by the finite difference method. The present results are validated by favorable comparisons with previously published results. Representative results depicting the effects the various parameters, namely, the buoyancy ratio parameter, and the Dufour and Soret numbers on the streamlines, isotherms, isoconcentration lines as well as the local Nusselt and Sherwood numbers are reported. In addition, numerical results for the average Nusselt and Sherwood numbers are presented in tabular forms for various parametric conditions and discussed. © 2018 Elsevier Ltd

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