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Linear and nonlinear thermosolutal instabilities in an inclined porous layer PURANAM ANANTH L NARAYANA, GAUTAM KUMAR, KIRTI SAHU, Indian Institute of Technology Hyderabad, India — We investigate the double-diffusive instability in an inclined porous layer with a concentration based internal heat source by conducting linear instability and nonlinear energy analyses. The effects of various dimensionless parameters, such as the thermal (Ra_T) and solutal (Ra_S) Rayleigh numbers, the angle of inclination (ϕ), the Lewis number (Le), and the concentration based internal heat source (Q) have been investigated. A comparison between the linear and nonlinear thresholds for the longitudinal and transverse rolls provides the region of the subcritical instability. We found that the system becomes more unstable when the diffusivity of the temperature is larger than that of the solute and with an increase in the internal heat source strength. It is observed that increasing inclination angle stabilises the system. Although the longitudinal roll remains stationary without the region of subcritical instability, the transverse roll transforms changes from stationary-oscillatory-stationary mode with the increase in the inclination angle.

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