

We studied numerically the effects of gas radiation on double-diffusive convection in a square enclosure filled with a non-gray air–H₂O mixture at different concentrations. Uniform temperatures and concentrations are imposed along the two vertical side walls of the enclosure so as to induce opposing thermal and mass buoyancy forces within the fluid. In this work, the radiative aspect of the problem is treated by the discrete ordinate method (to solve the radiative transfer equation) and the SLW spectral model (to account for the radiative properties of the non-gray mixture). Gas absorption varies with the local concentration of H₂O, which induces a strong direct coupling between the concentration and thermal fields that otherwise would not exist. Numerical results show that radiative effects on the characteristics of streamline, temperature and concentration fields are important, and depend on the nature of the flow regime (thermal at 5% H₂O, transitional at 10% and mass at 25%). The total heat transfer is reduced whatever the flow regime and the mass transfer is also affected, outside the thermal flow