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Convective instabilities in thermogravitational columns ABDELFATTAH ZEBIB, Rutgers University — Convective instabilities in side heated infinite vertical slots containing a single fluid are stationary, shear driven when the Prandtl number $Pr \tilde{\leq} 12.5$ while they are oscillatory, buoyancy dominated with $Pr \tilde{\geq} 12.5$ due to the diminished influence of the thermal diffusivity with increasing Pr. Here we examine the influence of the concentration field generated by thermodiffusion in a binary mixture of otherwise uniform concentration on this phenomenon. While positive/negative separation corresponds to enhanced/diminished buoyancy and should promote instability/stability, the induced positive/negative vertical concentration gradient of the light component, i.e., stable/unstable stratification, and the nonmonotic horizontal species separation demanded by the vanishing vertical mass flux, combine to result in the opposite effect. Thus increasing/decreasing the separation ratio ε is found to stabilize/destabilize both instability branches so that the cutoff Pr where there is a switch from preferred stationary to oscillatory states is a monotonic increasing function of ε.

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