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Convective Instabilities of Binary Mixtures in Annular Thermogravitational Columns ABDELFAH ZEBIB, Rutgers University, MOUNIR BOU-ALI, Mondragon Goi Eskola Politeknikoa — A theoretical and computational study of Soret separation of a binary mixture contained in a differentially heated infinite vertical annulus is presented. We first calculate the basic steady one-dimensional flow taking into account the vertical concentration gradient caused by thermodiffusion. Unstable (stable) stratification is induced at positive (negative) separation ratios. Linear stability of this basic state is performed and the critical Rayleigh number, wave number, frequency, and vertical concentration gradients are determined as functions of the separation ratio, Lewis and Prandtl numbers. It is shown that the preferred instability is axisymmetric when the induced vertical stratification is stable while it is azimuthal with unstable vertical stratification. Supercritical nonlinear computations are in agreement with linear theory and available experiments. Stability restrictions on the operation of the thermogravitational column will be discussed.

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