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Convective instability of a fluid layer induced by an inclined temperature gradient ALEJANDRO SEBASTIAN ORTIZ-PEREZ, LUIS ANTONIO DAVALOS-OROZCO, Departamento de Polímeros, Instituto de Investigaciones en Materiales, Universidad Nacional Autónoma de México — We present new results of the convective stability of a shallow layer of Newtonian fluid under the presence of an inclined temperature gradient. The horizontal component produces the so called Hadley circulation. The vertical component induces the well known Rayleigh convection with vertical Rayleigh number Ra_v. Here, the numerical results of Nield (1994) are corrected and extended for larger horizontal Rayleigh numbers, Ra_H. Two modes, the longitudinal and the transversal, compete as the most unstable in different regions of the parameters space which also includes the Prandtl number Pr. The calculations of these corrections were motivated by the paper by Kaloni and Qiao (1996) where they present only particular cases of the nonlinear energy stability of the problem. The horizontal temperature gradient stabilizes until certain magnitude after which the curves of criticality start to decrease because the magnitude of Ra_H is very near to its critical value. At this critical value the vertical Rayleigh number is zero. Our results agree very well with those of Kuo and Korpela (1986) (presented also in Wang and Korpela (1989)) who made numerical analysis of the linear instability of the Hadley circulation, presenting corrections to the classical paper by Hart (1972).

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