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Linear thermal convection in an oscillatory fluid layer: A Floquet analysis of a sinusoidal, time-periodic basic flow RUBEN AVILA, Facultad de Ingenieria, Universidad Nacional Autonoma de Mexico — The onset of thermal convection of a Boussinesq fluid confined in a plane layer with harmonic oscillation is investigated. The boundaries of the layer are parallel to the x-y plane of the Cartesian coordinate system. The temperature of the lower boundary is higher than the temperature of the upper boundary. The fluid layer oscillates around the y axis with a given amplitude and frequency. The basic velocity profile is sinusoidal and time-periodic. The flow with a linear basic temperature profile, ascends close to the hot boundary and descends close to the cold boundary. The basic harmonic flow is obtained numerically, and introduced as an analytical expression in the linearized equations of the vertical velocity, vorticity and temperature. The non-steady linear equations are formulated in terms of the parameters (the wave number, and the Rayleigh, Taylor and Prandtl numbers) that govern the system. The linear equations are solved (for a fluid with Prandtl number equal to 0.7) by a collocation method that is based on the Chebyshev polynomials. By using the Floquet theory, the thermal instability of the basic harmonic flow is studied. Curves of the critical values of the Rayleigh number and the wave number, as functions of the other parameters of the system are shown.

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