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On the effect of a non-uniform longitudinal ion flow on the linear ITG mode stability. MAURIZIO LONTANO, ENZO LAZZARO, MARIA CECILIA VARISCHETTI, Istituto di Fisica del Plasma, C.N.R., CNR-ENEA-EUR Association, via R. Cozzi 53, 20125 Milan, Italy — A one-dimensional model for slab ion temperature gradient (ITG) modes, in the presence of an inhomogeneous equilibrium plasma velocity along the main magnetic field direction, has been formulated in the frame of a two-fluid guiding-center approximation. The physical effects of a magnetic field gradient and of the line curvature are included by means of a gravitational drift velocity. The magnetic shear across the plasma slab is also taken into account. The linear stability of slow plasma dynamics, under the assumptions of quasi-neutrality and adiabatic electrons, is described by means of a third-degree dispersion relation. Generally speaking, the presence of a sheared longitudinal ion velocity leads to the linear destabilization of the ITG modes, especially for flat equilibrium density profiles. Transverse quasi-linear fluxes of ion thermal energy and longitudinal momentum are calculated for different equilibrium profiles of the density, temperature, momentum, and magnetic shear. Plasma configurations leading to zero transverse (or even negative) momentum fluxes are exploited and discussed in the light of their experimental implementation.

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