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Abstract
Sandberg, I. 2002. Drift and Mirror Modes in Magnetized Plasmas. Acta Universitatis Upsaliensis. *Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology* 723. 40 pp. Uppsala. ISBN 91-554-5334-1

Low frequency plasma instabilities driven by plasma inhomogeneity and velocity anisotropies are major candidates for the explanation of various phenomena observed in fusion and space plasmas. For low-β fusion plasma, the influence of plasma rotation and finite ion temperature on the structure and the type of toroidal drift eigenmodes in tokamaks is investigated rigorously, including the effects induced by the toroidal geometry such as the coupling mode, the radial variation of plasma rotation velocity and the magnetic shear. The conditions at which global or propagating drift modes are formed and the analytical dispersion relations are obtained for various cases. For high-β space plasma, a unified theory of the mirror instability based on a quasi-hydrodynamic approach and a unified fully kinetic theory of the drift mirror instabilities have been developed. The obtained results are applicable for arbitrary distribution functions and can be used to determine whether mirror and drift mirror modes are stable or unstable in a multi-component plasma, including electron temperature effects and electron pressure anisotropies. A major outcome of the theory of drift mirror instabilities, is the prediction of a hydrodynamic drift mirror instability with threshold lower than the classic ion drift mirror instability.

Keywords: tokamak plasma, drift waves, space plasma, mirror instability.

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