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Collisionless microtearing modes in large aspect ratio Tokamaks with weak reversed shear configurations ADITYA KRISHNA SWAMY, RAJARAMAN GANESH, Institute for Plasma Research, India, STEPHAN BRUNNER, JAN VACLAVIK, LAURENT VILLARD, CRPP, EPFL, 1015 Lausanne, Switzerland — Gyrokinetic simulations have found Collisionless Microtearing Modes (MTM) to be linearly unstable in sharp temperature gradient regions of tokamaks, typically with high magnetic shear. The collisionless MTM is driven by the magnetic drift resonance of passing electrons, aided by the closeness of Mode Rational Surfaces (MRS) arising due to the high shear. Here, the role of global safety factor profile variation on the MTM instability and global mode structure is studied, in particular in weak reverse shear (WRS) configurations in large aspect ratio tokamaks. At lower shear profiles, multiple MTM branches are found with tearing parity as well as mixed parity. The linear growth rates of MTM is found to be weakened and linearly unstable modes are found whose global mode structures of $\tilde{\varphi}$ and $\tilde{A}_{\parallel}$ exhibit Mixed Parity. For the same equilibrium profiles and parameters, AITG instability is also studied and global mode structures are compared with MTM. The growth rate spectrum is found to extend to shorter/mesoscale wavelengths in WRS. Several other characteristics of MTMs and AITG are recovered in the WRS configuration, such as the dependency on free energy source and on plasma β.

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