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Magnetorotational stability in a self-consistent three dimensional axisymmetric magnetized warm plasma equilibrium with a gravitational field[1] PETER CATTO, MIT Plasma Science and Fusion Center, SERGEI KRASHENINNIKOV, Department of Mechanical and Aerospace Engineering, UCSD — Magnetorotational stability is revisited for self-consistent three-dimensional magnetized hot plasma equilibria in a gravitational field. The eikonal analysis presented finds that magnetorotational stability analysis must be performed with some care to retain compressibility and density gradient effects, and departures from strict Keplerian motion. Indeed, retaining these effects highlights differences between the magnetorotational instability found in the absence of gravity [Velikhov 1959 *Sov. Phys. JETP* **36**, 995-998] and that found the presence of gravity [Balbus and Hawley 1991 *Astrophys. J.* **376**, 214-222]. In the non-gravitational case, compressibility and density variation alter the stability condition, while these effects only enter for departures from strict Keplerian motion in a gravitational field. The conditions for instability are made more precise by employing recent magnetized equilibrium results [Catto, Pusztai and Krasheninnikov 2015 *J. Plasma Phys.* **81**, 515810603], rather than employing a hydrodynamic equilibrium. We focus on the stability of the $\beta > 1$ limit for which equilibria were found in the absence of a toroidal magnetic field, where β = plasma/magnetic pressure.

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