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Non-axisymmetric three-dimensional modes in differentially rotating thin disks and rings[1] CHRIS CRABTREE, BRUNO COPPI, MIT — In the literature of the theory of differentially rotating magnetized plasmas around celestial objects whose gravity is prevalent, there are several approximations that are often invoked. Namely, 1) that the perturbation is symmetric about the axis of rotation, 2) that the plasma beta (the ratio of thermal energy density to magnetic energy density) is very high, and 3) that the fluid motion is incompressible. When axisymmetry is abandoned there are singularities where: 1) the Doppler shifted frequency of the mode corresponds to the frequency of the "slow" magnetosonic mode [1], which would be eliminated by the third assumption above, and 2) where the Doppler shifted mode frequency corresponds to the shear Alfven frequency. Because of several arguments including Cowling's theorem [2], which states that magnetic field dynamo generation cannot occur in two-dimensional motions, the non-axisymmetric three-dimensional modes [1] must be confronted. In addition, it is also reasonable to assume that the plasma beta cannot be large in disks from which jets emerge. In this work an attempt is made to consider three-dimensional modes (as were considered in Ref. [1]) for equilibrium configurations that have substantial toroidal currents. [1] B. Coppi & P. S. Coppi, *Ann. of Phys.* **291**, 134 (2001). [2] T. G. Cowling, *MNRAS* **94**, 39 (1933).

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