# Global equilibria of a hot, magnetized and rotating plasma in a gravitational field

Peter J. Catto[1], Sergei I. Krasheninnikov[2], Istvan Pusztai[3]

[1] *Plasma Science and Fusion Center, MIT, Cambridge, MA 02139, USA*

[2] *University of California at San Diego, La Jolla, CA 92093, USA*

[3] *Department of Applied Physics, Chalmers University of Technology, SE-41296 Göteborg, Sweden*

We present analytic and numerical solutions for three-dimensional magnetized axisymmetric equilibria confining rotating hot plasma in a gravitational field. Our solution to the full Grad-Shafranov equation can exhibit strong equatorial plane localization of the plasma density and current, resulting in disk equilibria for the plasma density. Unlike in [1], we find a toroidal magnetic field is often necessary to find an equilibrium in the presence of gravity when the plasma pressure is less than the magnetic pressure. However, when the magnetic pressure is much less than the pressure of the plasma the toroidal magnetic field becomes unimportant as in [1]. We expect our results to provide impetus to re-investigate magneto rotational stability [2, 3] in accretion disks.

**References**

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