

# **Axisymmetric Instabilities For Plasma Columns With Parabolic Profile: Current Relaxation And Inductionless Approximation**

F. E. M. Silveira<sup>1</sup> and R. M. O. Galvão<sup>2</sup>

<sup>1</sup>*Universidade Federal do ABC, Santo André, Brazil*

<sup>2</sup>*Universidade de São Paulo, São Paulo, Brazil*

A new equilibrium flow is proposed for a magnetized rotating plasma column with a parabolic profile. It is shown that the specific angular momentum density  $L = ar^2 + br^{-1/2}$  attains a minimum value for a given radial coordinate  $r$  which depends on the constants  $a$  and  $b$ . By assuming a finite current relaxation in the inductionless approximation, it is found that the fluid becomes axisymmetrically unstable for certain imaginary values of the epicyclic frequency. The results presented here can be of interest for investigations of resistive instabilities for both laboratory and astrophysical plasmas. Possible directions to extend the proposed formulation are suggested. This work may also contribute to turn the notion of the inductionless approximation into a somewhat more precise concept.