

**Alfvénic Activity in Reversed-Field Pinch Plasmas**

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A variety of Alfvén eigenmodes has been observed in the magnetic spectra of reversed field pinch (RFP) plasmas. In the RFX-mod device, long wavelength high frequency ($>400\text{kHz}$) modes have been detected in ohmically heated plasmas, whose amplitude is found to be enhanced during the spontaneous reconnection processes characterizing the RFP dynamics [1]. The Alfvénic nature of such fluctuation is deduced by the linear dependence of the associated frequency on the Alfvén velocity. More recently, a lower frequency branch of discrete coherent Alfvén eigenmodes has been observed to be destabilized in RFX-mod when the spontaneous transition from an axisymmetric to a single helical equilibrium occurs at high plasma current levels (above 1MA).

In the MST experiment, energetic particle modes, part of them lying in the Alfvén continuum, characterized by a bursty behavior in the 50-200 kHz frequency range, have been observed to be destabilized by the injection of 25 keV particles from a 1MW NBI system [2].

A newly discovered higher frequency, more continuous in time, Alfvénic mode induced in MST by NBI will be here presented, whose spectral properties are found to be strongly influenced by the beam characteristics, in particular, by the fast particle velocity and modulated by the low frequency MHD behavior associated with tearing mode activity. Moreover, it will be shown that in the MST spectra, a long wavelength mode family has been recognized in ohmically heated plasmas, which resembles those observed in the RFX-mod experiment when operated in standard axisymmetric equilibria.

The spectral properties of such instabilities will be here compared to those predicted by numerical simulations performed with the 3D MHD nonlinear visco-resistive code SpeCyl [3], which suggest that reconnection processes in the RFP may destabilize Global Alfvén eigenmodes, as well as Compressional modes, normally disregarded in Tokamak plasmas, because of the associated very high frequency.

References

- [1] S. Spagnolo et al., Nucl. Fusion 51, (2011) 083038
- [2] J. J. Koliner et al., Phys. Rev. Lett. 109, (2012) 115003
- [3] S. Cappello and D. Biskamp, Nucl. Fusion 36, (1996) 571