

P1.1053 Shaping effects on the interaction of shear Alfvén and slow sonic continua

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See the full abstract here:

<http://ocs.ciemat.es/EPS2019ABS/pdf/P1.1053.pdf>

Experimentally it is observed that modes at frequency lower than toroidicity-induced Alfvén eigenmodes (TAEs) could enhance the loss of circulating ions injected in the plasma by the heating system, degrading the plasma confinement [1]. These low frequency modes can be identified with beta-induced Alfvén-acoustic eigenmodes (BAAEs), that exist in a frequency gap generated by the interaction between the Alfvénic continuum and the sound branches that differ from it in one poloidal mode number. In a compressible plasma the geodesic curvature (kG) [2] couples a Alfvén harmonic with poloidal number m_A with a sound harmonic with $m_S = m_A \pm \delta$, with δ an integer number. An equilibrium model with circular magnetic surfaces provides an harmonic content to the geodesic curvature that is able to couple only branches with $\delta = 1$. In this work a non circular equilibrium is considered, thanks to which the geodesic curvature can be expanded in further harmonics of the poloidal angle. This increased spectral content allows the Alfvénic continuum to interact with sonic displacements corresponding to a higher poloidal mode number difference δ , which results in extra frequency gaps in the continuum induced by the plasma shaping. Inside these gaps discrete eigenmodes were computed with the MHD code CASTOR (Complex Alfvén Spectrum in TORoidal geometry) [3], whose frequencies, assuming values between BAAEs and TAEs ones, make them good candidates to interact with fast ions. A critical value of the safety factor, that if exceeded suppresses the Alfvénic-sonic coupling, is set and other conditions to access the existence of shaping-induced gaps are discussed.

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References

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