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TH/P7-04: High Frequency Geodesic Acoustic Modes in Electron Scale Turbulence

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There has been overwhelming evidence that coherent structures such as vortices, streamers and zonal flows (m = n = 0, where m and n are the poloidal and toroidal modenumbers respectively) play a critical role in determining the overall transport in magnetically confined plasmas [1]. Some of these coherent structures, so called streamers, are radially elongated structures that cause intermittent, bursty events, which can mediate significant transport of heat and particles, for instance, imposing a large heat load on container walls.
In this work the presence of a high frequency branch of the geodesic acoustic mode (GAM)driven by electron temperature gradient (ETG) modes is demonstrated. The work is based on a fluid description of the ETG mode retaining non-adiabatic ions and the dispersion relation for high frequency GAMs driven nonlinearly by ETG modes is derived. A new saturation mechanism for ETG turbulence through the interaction with high frequency GAMs is found, resulting in a significantly enhanced ETG turbulence saturation level compared to the mixing length estimate.

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