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An Universal Mechanism of Saturation of ITG/ETG Modes via Coupling to Ion Acoustic Modes VLADIMIR SOKOLOV, AMIYA K. SEN, Columbia University — New experimental results in the Columbia Linear Machine indicate that both Ion Temperature Gradient (ITG) and Electron Temperature Gradient (ETG) modes are nonlinearly saturated via coupling to ion acoustic modes. The 3-wave coupling of two high frequency ITG or ETG mode radial harmonics (at $\sim 140kHz$ or $\sim 2.4MHz$ respectively) and one low frequency ion acoustic mode (at $\sim 10kHz \backslash \sim 40kHz$) is validated via bi-coherence studies. Direct measurements of axial and azimuthal wave numbers of the low frequency mode prove that it is the ion acoustic mode. A novel feedback diagnostic also experimentally verifies this scenario. The 3-wave coupling model (two radial harmonics of ITG or ETG and one ion acoustic mode) yielded a theoretical saturation level of ITG \ ETG mode $\sim 3\% \backslash \sim 7\%$, which roughly agrees with experiments. This mechanism may be valid for any drift wave with the radial harmonics structure due to profile variation of $\omega_T^\star$. This research was supported by U.S. Department of Energy Grant No. DE-FG02-98ER-54464.

Vladimir Sokolov
Columbia University

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