Spatial-temporal evolution of the nonlinear DW-GAM system

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Kinetic effect and plasma nonuniformity plays an important role in the parametric excitation of Geodesic Acoustic Mode (GAM)/kinetic GAM (KGAM) by drift wave (DW) turbulence. In this work, we study the coupled equations between GAM/KGAM and DW sidebands, and investigate the effects of plasma nonuniformities such as GAM continuum, nonuniform DW frequency and nonuniform pump wave amplitude on GAM/KGAM excitation. We found that, the convective/absolute nature of the parametric instability is changed when nonuniform DW frequency is taken into account, and the growth rate scales as pump wave amplitude in the marginal unstable limit, while in the strong drive limit, a broad spectrum of modes are excited, and the growth rate of the most unstable mode scales as pump wave amplitude square.