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Effects of phase mixing and resonant detuning on GAMs[1] CHING-PUI HUNG, ADIL HASSAM, IREAP, Univ. of Maryland — Geodesic acoustic modes (GAMs) are axisymmetric poloidal oscillations of plasma in tokamaks, caused by magnetic curvature and perpendicular compression of flux tubes as they move in a non-uniform magnetic field. It has been proposed[2] to drive GAMS resonantly by external drivers. For power requirements, it is important to study the dissipation mechanisms. Here we study damping from (1) phase mixing of oscillations and (2) nonlinear detuning. Phase mixing of 2D waves propagating in inhomogeneous media can result in a higher damping rate. For example, for Alfven waves propagating transverse to a phase speed inhomogenenity, the damping rate is proportional to exp[-(t/τ)^3], instead of the usual exp(-t/τ), where 1/τ is proportional to the resistivity η. We study this phenomenon for Alfven waves and for GAMs. The results are verified by simulation with a dissipative MHD code. In addition, numerical simulation shows that the resonant amplification of magnetosonic waves driven at resonance is greatly inhibited by nonlinearities: the power spectrum is broader than the linear case Lorentzian. GAMs have similar mathematical structure to magnetosonic waves. The effect of nonlinearity in driven GAM systems will be examined.

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[2]K. Hallatschek and G. McKee, Sherwood Fusion Theory Meeting (Austin, Tx., 2011)

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