Excitation of GAMs by coupling with electron drift and ITG modes*

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The geodesic acoustic modes (GAMs) can be excited by mode coupling to primary modes like the drift waves and ion temperature gradient modes in tokamak plasmas. Recent global numerical simulations of ITG modes show excitation of GAMs and indicate that the radial wavenumber of the excited GAMs scales inversely as the ion larmor radius. Also the modes are excited dominantly in the edge region of the device (though not in simulations). Furthermore there is a nonlinear down-shift of the GAM frequency compared to the predicted linear mode frequency in many ITG/GAM simulations. We present mode coupling analysis which provides an explanation of the scaling of the radial wavenumber, the preferential excitation of GAMs in the outer half of the plasma and the nonlinear downshift of the frequency of GAMs. An interesting resonant three-wave coupling between an ITG mode, drift wave and GAM is also found. The implications of all these processes in simulations and experimental devices will be presented.

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