Geodesic mode spectrum modified by the energetic particles in tokamak plasmas
A.G. Elfimov, R.M.O. Galvão

Institute of Physics, University of São Paulo, São Paulo, 05508-090 Brazil

Effect of a minor concentration of the energetic particles on GAM spectrum in a tokamak is analyzed by drift kinetic theory taking into the account the electron current and diamagnetic drift. We extend the results of Ref 1 for toroidal geometry. A novel method of Jacobi functions is applied to solve the drift kinetic equation for the energetic bounce particles in the limit of high bounce frequency in comparison with the GAM frequency. Using the \( Q \)-asymptotic of Jacobi function, it is shown that the energetic minority ions can form the continuum minimum/maximum at the NB or ICR power deposition maximum where the geodesic eigenmode may be excited. In this case, the electron current modeled by shifted Maxwell distribution overcomes the ion Landau damping threshold thus resulting in the GAM instability, as well the instability may be excited due to radial plasma inhomogeneity of energetic particles.


Keywords: tokamak, Geodesic Acoustic Modes, kinetic theory, instability, Landau damping.