Gyrokinetic particle simulation of toroidicity induced Alfven eignmode

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In this work gyrokinetic simulation of the global Alfvenic waves driven by the energetic particles has been performed using the GTC code [1]. A fluid-kinetic hybrid model [2] is employed which is based on an expansion of the electron response using a small parameter of the square-root of the electron-ion mass ratio. The model preserves the linear and the nonlinear wave-particle interactions. In the simulation, continuum damping of the shear Alfven wave is demonstrated [3]. Due to the toroidal effects, the frequency gap [4,5] is generated. In the presence of the energetic particles, excitations of toroidicity induced Alfven eigenmode (TAE) is observed. Identification of the most unstable perpendicular wavelength (the poloidal mode number) is discussed. This work is supported by US DOE SciDAC GSEP and GPS-TTBP.

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