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Gyrokinetic simulations of low-frequency Alfven eigenmodes in DIII-D plasmas[1] GYUNGJIN CHOI, ZHIHONG LIN, University of California, Irvine — Global gyrokinetic simulations of a DIII-D plasma discharge (#178631) find a Beta-induced Alfven Eigenmode (BAE) excited by the fast ion density gradients and a lower-frequency mode (LFM) excited by thermal plasma pressure gradients in the absence of the fast ions. Both BAE and LFM have mode structures near the qmin flux surface, consistent with experimental observations. The polarization of both modes are mostly Alfvenic. There is a continuous transition from BAE to LFM when fast ion density or temperature decreases. The unstable BAE frequency is just above the lower continuum of the BAE gap, while the LFM is inside the Beta-induced Alfven-Acoustic Eigenmode (BAAE) gap. Simulations of antenna excitation in a uniform thermal plasma find a damped BAE with a frequency higher than the unstable BAE, but no BAAE, indicating that both unstable BAE and LFM are strongly non-perturbative. The LFM frequency is insensitive to electron density and temperature but decreases when thermal ion temperature decreases. The LFM growth rate increases with increasing electron density and temperature and thermal ion temperature. Nonlinear simulations have showed that both zonal flow and phase space structure play crucial roles on nonlinear saturation of BAE. Results of ongoing nonlinear simulations and impact of BAE and LFM on fast ion transport will be presented.

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