Gyrokinetic Particle Simulation of Fast-Electron Driven Beta-induced Alfven Eigenmodes*

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- The fast electron driven Beta-induced Alfven Eigenmode (BAE) has been routinely observed in HL-2A tokamak.
- the fast-electron driven BAE is investigated for the first time using the global gyrokinetic particle simulations
- Frequency chirping is observed in nonlinear simulations in the absence of sources and sinks.
- the frequency chirping is induced by the nonlinear evolution of the coherent structures in the fast electron phase space
- In the strongly driven case, BAAE is also unstable and co-exists with BAE after the BAE saturation
- Zonal fields are found to affect wave-particle resonance in the nonlinear BAE simulations
- A verification and validation study is carried out for a sequence of fast-electron driven beta-induced Alfven eigenmode (BAE) in HL-2A tokamak plasma using realistic profiles and equilibria constructed from the HL-2A discharges