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Verification and Validation of Gyrokinetic Particle Simulation of Fast Electron Driven Beta-induced Alfvén Eigenmodes on HL-2A Tokamak JUNYI CHENG, YANG CHEN, WENLU ZHANG, Institute of Physics, Chinese Academic of Science, Beijing 100190, China, ZHIHONG LIN, Department of Physics and Astronomy, University of California, Irvine CA 92697, USA, WEI CHEN, LIMIN YU, XUANTONG DING, Southwestern Institute of Physics, Chengdu, Sichuan 610041, China — A verification and validation study is carried out for a sequence of fast electron driven beta-induced Alfven eigenmodes in HL-2A tokamak plasma. The fast electron driven beta induced Alfvén eigenmode (e-BAE) in toroidal plasmas is investigated for the first time using global gyrokinetic particle simulations, where the fast electrons are described by the drift kinetic model. The phase space structure shows that only the processional resonance is responsible for the e-BAE excitations while fast-ion driven BAE can be excited through all the channels such as transit, drift-bounce, and processional resonance. For weakly nonlinear driven case, frequency is observed to be in phase with the particle energy flux, and mode structure is almost the same as linear stage . While in the strongly driven nonlinear case, BAAE is excited after the BAE mode saturated. The simulation of e-BAE with the HL-2A tokamak parameters is taken. Three modes n/m= 1/2 , 2/5 ,1/3 in HL-2A can be excited in our simulations.

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