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Verification and Validation of Integrated Simulation of Energetic Particles in Toroidal Plasmas[1] GYUNGJIN CHOI, ZHIHONG LIN[2], University of California, Irvine — As the first step in developing the predictive capability, verification and validation of linear simulations of Alfven eigenmodes in the current ramp phase of DIII-D L-mode discharge 159243 have been carried out by eight gyrokinetic, gyrokinetic-MHD hybrid, and eigenvalue codes from US, EU, and Japan. The simulated most unstable reversed shear Alfven eigenmode(RSAE) frequencies agree with experimental measurements if the minimum safety factor qmin is adjusted within experimental errors. A toroidal Alfven eigenmode(TAE) is found to be unstable in the outer edge, consistent with the experimental observations. Electron temperature fluctuations and radial phase shifts from simulations using synthetic diagnostics show no significant differences with the experimental data for the strong RSAE, but significant differences for the weak TAE. Furthermore, gyrokinetic toroidal code(GTC) simulations find that the most unstable ion temperature gradient(ITG)-like mode has an amplitude peaking in the core, but large fluctuations nonlinearly spread to the whole radial domain. These results indicate that RSAE and TAE in this DIII-D experiment could interact nonlinearly with each other and with the microturbulence. Finally, GTC simulations of TAE have also been validated in JET, HL-2A and KSTAR.

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