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Benchmarking of the Gyrokinetic Microstability Codes GEM, GYRO, and GS2 including Equilibrium ExB Rotation Shear[1] RONALD BRAVENEC, Fourth State Research, YANG CHEN, SCOTT PARKER, University of Colorado, Boulder, JEFF CANDY, General Atomics, MICHAEL BARNES, PSFC, MIT, CHRISTOPHER HOLLAND, NATHAN HOWARD, University of California, San Diego — The physics capabilities of gyrokinetic microstability codes are now so extensive that one cannot demonstrate that the codes correctly solve the gyrokinetic-Maxwell equations (verification) for realistic tokamak plasmas using purely analytic approaches. Instead, one must rely on comparing results from different codes, preferably using different algorithms, for identical plasmas and physics (benchmarking). We present linear and nonlinear comparisons of the Lagrangian particle-in-cell (PIC) code GEM with the Eulerian codes GYRO and GS2 for a low-power DIII-D discharge at the mid-radius. The benchmarking includes not only electron collisions, plasma shaping, kinetic electrons, and one impurity, but also equilibrium **ExB** rotation shear in the nonlinear simulations. We also present benchmarks for a low-q Alcator C-Mod discharge with broad density profiles, low q and shear, and for the DIII-D plasma at the location of a transport shortfall predicted by GYRO.

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