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Benchmarking Particle-in-Cell drift wave simulations with Eulerian simulations in a flux-tube YANG CHEN, SCOTT PARKER, WEIGANG WAN, University of Colorado at Boulder, RONALD BRAVENEC, Fourth State Research, ERIC WANG, Lawrence Livermore National Lab, JEFF CANDY, General Atomics — We present the implementation of a flux-tube option in the global turbulence code GEM.[1] This is necessary for benchmarking purposes because of the immense complexity involved in comparing global simulations. The global GEM assumes the magnetic equilibrium to be completely given. Our initial flux-tube implementation simply selects a radial location as the center of the flux-tube and a radial size of the flux-tube, sets all equilibrium quantities (B, ∇B, T, ∇T, the Jacobian etc.) to be equal to their values at the center of the flux-tube, and retains only a linear radial profile of the safety factor needed for boundary conditions. We found good agreement between GEM and GYRO/GS2 for the mode frequency/growth rate in the case of adiabatic electrons, but a difference of $\sim 15\%$ in the growth rates when kinetic electrons are included. Our goal is to understand the origin of this moderate disagreement. An alternative local geometry model based on a local solution of the Grad-Shafranov equation[2] has been implemented and new benchmarking results from this model will be presented.

[1]Y. Chen and S. E. Parker, J. Comp. Phys. 220, 839 (2007)
[2]J. Candy, Plasma Phys. Control. Fusion 51, 105009 (2009)

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