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Gyrokinetic Simulation of Energetic Particles Turbulence and Transport in Fusion Plasmas WENLU ZHANG, ZHIHONG LIN, IHOR HOLOD, YONG XIAO, ANDREAS BIERWAGE, UC Irvine, CA, DONALD SPONG, ORNL, Oak Ridge, TN, MING CHU, GA, San Diego, CA, GSEP TEAM
— The confinement of the energetic particles (EP) is a critical issue in the International Thermonuclear Experimental Reactor (ITER), since that ignition relies on the self-heating by the fusion products. Shear Alfven wave excitations by EP in toroidal systems, for example Toroidal Alfven Eigenmode (TAE) and Energetic Particle Mode (EPM) have been investigated as primary candidate for fluctuation-induced transport of EP in fusion plasma. In this work, TAE excitations by energetic particles are investigated in large scale first-principle simulations of fusion plasmas using the global gyrokinetic toroidal code (GTC) [Lin, Science 1998]. Comprehensive linear benchmarking results are reported between GTC, GYRO, fluid code TAEFL, and Magnetohydrodynamic-gyrokinetic hybrid code HMGC.

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