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Gyrokinetic particle characterization of core turbulence in tokamaks JEAN-NOEL LEBOEUF, JNL Scientific, BENJAMIN CARRERAS, BACV Solutions, VIKTOR DECYK, UCLA, DAVID NEWMAN, U. Alaska Fairbanks, RAUL SANCHEZ, ORNL — We are continuing to characterize transport in gyrokinetic calculations of ion channel turbulence in tokamaks with the three-dimensional global toroidal nonlinear parallel particle-in-cell UCAN code. In particular, we are taking full advantage of the extended particle manager in UCLA's own PLIB library of massively parallel particle and field managing MPI routines. It now automatically handles tracking/tracing of the same active simulation particles through space and time and especially multiple processors, including restarts with different numbers of tagged particles. The particle data thus tracked and stored comprise the complete set of positions and velocities for each tracked particle at each chosen instant of time (typically every 100th time step). These particle data have been analyzed with tools previously applied to passive marker particles in fluid turbulence simulations which are specifically aimed at revealing the non-diffusive aspects of particle and heat transport. The UCAN calculations show that the transport signatures are different without and with zonal flows self-consistently generated from the fluctuations allowed to evolve. These differences are explored in this presentation for tokamak discharges with DIII-D parameters and profiles.

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