# Particle characterization of transport in global gyrokinetic calculations of ion channel turbulence in tokamak plasmas

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We are in the process of characterizing transport in gyrokinetic calculations of ion channel turbulence in tokamak plasmas with the three-dimensional global toroidal nonlinear parallel particle-in-cell UCAN code. In particular, we have extended the particle manager in UCLA's own PLIB library of massively parallel particle and field managing MPI routines to automatically handle tracking/tracing of the same active simulation particles through space and time and especially multiple processors. 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 transport characteristics from UCAN calculations without and with zonal flows self-consistently generated from the fluctuations allowed to evolve will be presented.