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Phase Space Structures in Toroidal Ion Temperature Gradient Turbulence[1] T.-H. WATANABE, H. SUGAMA, National Institute for Fusion Science, Toki, Japan, W. HORTON, University of Texas at Austin, IFS — The velocity space structures of the ion distribution function associated with toroidal ion temperature gradient (ITG) driven turbulence is shown for the almost collisionless regime relevant to burning fusion plasmas. The zonal flows are taken into account and the geodesic acoustic mode (GAM) is reproduced with the neoclassical polarization from the trapped ions as well as the ballistic mode structures. Detailed plots of the ion velocity space showing clearly the different response of the trapped and passing ions in the zonal flows and the ITG modes are presented. The fine scale structures are resolved with velocity grid of 1025×65 which resolves the structures down to $\nu_{*i} = 0.04$ deep into the banana regime. Runs are sufficiently long in time to establish a steady state in which the entropy production from the ion temperature gradient is followed through the turbulence and dissipated with a Lenard-Bernstein collision operator on the smalles scale of the velocity grid. The resulting gyro-Bohm coefficient for is 1.4 for the usual Cyclone DIII-D base case as reported in Watanabe and Sugama 2006.

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