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Isotope Effects due to Ion Temperature Gradient Drift Instabilities in Global Gyrokinetic Particle Simulation[1] W.W. LEE, S. ETHIER, W.X. WANG, Princeton Plasma Physics Laboratory, Princeton University, Princeton, NJ 08543 — Ion temperature gradient (ITG) drift instabilities using the global Gyrokinetic Turbulence Code (GTC) [Z. Lin et al., Science <281>, 1835 (1998)] have been carried out using different hydrogen species (H+, D+ and T+) to study the isotope effects. Since it is commonly believed that, in the GyroBohm regime with $\chi_i \propto \sqrt{M}/B^2$, the ion thermal diffusivity should increase for heavier hydrogen isotopes. On the other hand, in the Bohm regime with $\chi_i \propto 1/B$, the ion thermal diffusivity is independent of the mass. To test these hypotheses, we have carried out simulations with different minor radii to insure that we are indeed in both of the regimes [Lin et al., Phys. Rev. Lett. (2002)]. In these simulations, both the $\mathbf{E} \times \mathbf{B}$ nonlinearity and the parallel velocity space nonlinearity have been included, since both of them are closely related the zonal flows dynamics. Preliminary results have indicated that favorable isotope effects are always present. However, it is not as prominent as those reported earlier [W. W. Lee and R. A. Santoro, Phys. Plasmas <4>, 169(1997)]. Initial theoretical understanding will be presented.

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