Abstract Submitted
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Isotope and mixture effects on neoclassical transport in the pedestal[1] ISTVAN PUSZTAI, STEFAN BULLER, JOHN T. OMOTANI, Chalmers University of Technology, SARAH L. NEWTON, CCFE, Culham Science Centre — The isotope mass scaling of the energy confinement time in tokamak plasmas differs from gyro-Bohm estimates, with implications for the extrapolation from current experiments to D-T reactors. Differences in mass scaling in L-mode and various H-mode regimes suggest that the isotope effect may originate from the pedestal. In the pedestal, sharp gradients render local diffusive estimates invalid, and global effects due to orbit-width scale profile variations have to be taken into account. We calculate neoclassical cross-field fluxes from a radially global drift-kinetic equation using the PERFECT code [Landreman et al. (2014) PPCF **56** 045005], to study isotope composition effects in density pedestals. The relative reduction to the peak heat flux due to global effects as a function of the density scale length is found to saturate at an isotope-dependent value that is larger for heavier ions. We also consider D-T and H-D mixtures with a focus on isotope separation. The ability to reproduce the mixture results via single-species simulations with artificial "DT" and "HD" species has been considered. These computationally convenient single ion simulations give a good estimate of the total ion heat flux in corresponding mixtures.

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