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Rotation Speed Differences of Impurity Species in the DIII-D Tokamak and Comparison with Neoclassical Theory[1]

L.R. BAYLOR, W.A. HOULBERG, M. MURAKAMI, Oak Ridge National Laboratory, K.H. BURRELL, R.J. GROEBNER, GA, D.R. ERNST, PPPL — Toroidal rotation velocity profiles of carbon, helium, and neon have been measured on the DIII-D tokamak with the charge exchange recombination (CER) spectroscopy diagnostic. Neoclassical theory predicts a relation between the toroidal rotation speeds of the different impurities. In order to make an accurate comparison with theory, the CER data analysis requires taking into account the energy dependent charge-exchange cross sections for the different species. Upgrades in the CER analysis code to take this cross-section effect into account are made and checked with transitions that have different energy dependence. The toroidal rotation speed of these impurities was measured in quiescent double-barrier (QDB), RI-mode, and PEP-mode discharges. Differences in the toroidal rotation speeds of the impurities in the same discharge are compared with neoclassical theory using the FORCEBAL/NCLASS and TRV codes.

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