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Poloidal variation of Ar^{16+} impurity density in Alcator C-Mod plasmas[1] MATTHEW REINKE, IAN HUTCHINSON, JOHN RICE, JIM TERRY, MIT PLASMA SCIENCE AND FUSION CENTER TEAM — Vertical poloidal asymmetries in impurity density have been observed in a number of tokamaks but have yet to be quantitatively explained by neoclassical theory. This up/down asymmetry, thought to be driven by a combination of ion-impurity friction and inertial forces, is being investigated in the wider context of verifying parallel impurity force balance theory necessary to utilize trace impurity flow measurements to calculate main-ion flows. The recent installation of an x-ray crystal imaging spectrometer allows simultaneous measurement of the up/down asymmetry in Ar^{16+}density as well as radial profiles of the impurity temperature and both the poloidal and toroidal flows. The up/down density ratio was measured in Ohmic and ICRF-heated L-mode plasmas and shown to vary from 0.5 to 3.0 over a range of electron density, $0.2 < n_e < 2.0\ 10^{20}$ [m^{-3}] and plasma current, $0.4 < I_p < 1.2$ [MA]. The impurity density, n_z, is typically higher in the direction away from the ∇B drift, regardless of x-point location and the asymmetry is localized to $r/a > 0.75$. At low density, $n_e < 0.5x10^{20}$ [m^{-3}] the ratio falls below unity indicating a reversal. For $n_e > 0.5x10^{20}$ [m^{-3}] the ratio is shown to scale linearly with n_e/I_p, qualitatively consistent with theory.

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