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Experimental and computational evaluation of neutrals in the Alcator C-Mod edge pedestal[1] J.W. HUGHES, D. MOSSESSIAN, B. LABOMBARD, J. TERRY, MIT PSFC — Pedestal-forming edge transport barriers (ETBs) in tokamak plasmas and the physics governing them are linked to the enhancement of confinement obtained in H-mode plasmas. Studies on Alcator C-Mod employ experimental measurements and simple 1-D transport models in order to better understand ETB physics. We examine the influences of ionization and charge exchange on the pedestals in electron density and temperature. Routine measurements from edge Thomson scattering (ETS) give pedestal scalings with global plasma parameters, while individual ETS profiles are combined with scanning Langmuir probe data and optical D_α emissivity measurements to give atomic density profiles and the associated radial distribution of the ionization source rate. From H-mode profiles of these quantities a well in effective plasma diffusivity is calculated, and is shown to systematically vary as the confinement regime is varied from ELM-free to EDA. Experimental work is supplemented with modeling and computation of edge neutral transport via KN1D, a kinetic solver for atomic and molecular distribution functions in slab geometry. The level of agreement between experiment and model is encouraging.

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