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Observations of Rotation Reversal and Fluctuation Hysteresis in Alcator C-Mod L-Mode Plasmas[1] N.M. CAO, J.E. RICE, A.E. WHITE, S.G. BAEK, A.J. CREELY, P.C. ENNEVER, A.E. HUBBARD, J.W. HUGHES, J. IRBY, P. RODRIGUEZ-FERNANDEZ, Massachusetts Institute of Technology, M.A. CHILENSKI, Systems and Technology Research, P.H. DIAMOND, University of California, San Diego, M.L. REINKE, Oak Ridge National Laboratory, AND ALCATOR C-MOD TEAM, MIT — Intrinsic core toroidal rotation in Alcator C-Mod L-mode plasmas has been observed to spontaneously reverse direction when the minimum value of the normalized collisionality ν^*, crosses around 0.4. In Ohmic plasmas, the rotation is co-current in the low density linear Ohmic confinement (LOC) regime and counter-current in the higher density saturated Ohmic confinement (SOC) regime. The reversal manifests a hysteresis loop in ν^*, where the critical collisionalities for the forward and reverse transitions differ by 10-15%. Temperature and density profiles of the two rotation states are observed to be indistinguishable to within experimental error estimated with Gaussian process regression. However, qualitative differences between the two rotation states are observed in fluctuation spectra, including the broadening of reflectometry spectra and, under certain conditions, the appearance of high-k features in phase contrast imaging (PCI) spectra ($k_\theta \rho_s$ up to 1). These results suggest that the turbulent state can decouple from local profiles, and that turbulent self-regulation may play a role in the LOC/SOC transition.

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Norman Cao
Massachusetts Institute of Technology

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