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Overview of Toroidal Rotation Observations in Alcator C-Mod Plasmas JOHN RICE, MATT REINKE, YURI PODPALY, YIJUN LIN, MIT PSFC — Spontaneous toroidal rotation, self-generated in the absence of external momentum input, exhibits a rich phenomenology in C-Mod. In Ohmic L-mode plasmas, the rotation is predominantly in the counter-current direction and varies in a complicated fashion with electron density, magnetic configuration and plasma current. Abrupt rotation reversals have been observed, with the magnitude of the reversals typically 10s of km/s, and triggered by slight changes in the electron density or plasma current. In contrast, the rotation in H-mode plasmas is mainly directed co-current, and has a relatively simple parameter dependence, with the magnitude of the core velocity proportional to the stored energy normalized to the plasma current. The co-current rotation is observed to propagate in towards the center from the plasma edge following the H-mode transition, on a time scale similar to the energy confinement time. Similar rotation characteristics are seen in I-mode plasmas. The magnitude of the intrinsic rotation in H- and I-mode is related to the pedestal temperature gradient. ICRF mode conversion flow drive, with co-current velocities as high as 100 km/s, has been demonstrated. In contrast, with LHCD the rotation is strongly peaked in the counter-current direction in the central half of the plasma, with the strong gradient region near r/a=0.3. A variety of velocity profile shapes has been observed, indicating the presence of a momentum pinch.

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