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Confinement Regime Transition: Spontaneous Rotation Reversal and Collisionality of the Plasma Edge* C. DI SANZO, B. COPPI, M. LANDREMAN, M.I.T. — Within the context of the accretion theory [1] of the spontaneous rotation phenomenon, the transition between the L and the H confinement regimes is associated with the reversal of the phase velocity of collisional ballooning modes that can be excited at the edge of the plasma column. These modes are driven by the combined effects of the plasma pressure gradient and the magnetic field curvature, and involve in an essential way the electron-ion and ion-neutral collision rates and the effective transverse (concerning poloidal perturbed velocities) ion viscosity. According to the accretion theory the modes eject plasma angular momentum in the same direction as that of their phase velocity. When the edge is weakly collisional and characterized by local sharp density gradients (as in the H-regime) the mode rotates in the direction of the electron diamagnetic velocity. Under the opposite conditions (L-mode) the phase velocity is in the reverse direction and the consequent recoil causes the plasma column to rotate in the electron diamagnetic velocity direction. It is argued that the quality of confinement is associated with the rate of expulsion of angular momentum. A new resistive electrostatic mode that is driven by gradients of the ion pressure and of the longitudinal flow velocity has been found. *Sponsored in part by the US D.O.E. and the N.S.F.
[1] B. Coppi, Nucl. Fus. **42**, 1 (2002)

Bruno Coppi
M.I.T.

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