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Recent Advances in Plasma Edge Physics Theory[1] W.M. STACEY, GA Tech — This presentation summarizes recent theory developments for interpreting plasma edge physics experiments in DIII-D. i) Radial and poloidal moment balance require that the radial particle flux be of a pinch-diffusive nature with the pinch representing the electromagnetic forces and external momentum input. Ion radial particle fluxes in experiment are found to be a smaller difference between large outward diffusion fluxes and inward pinch fluxes. When the pinch-diffusion relation is used in the continuity equation a new diffusion theory that preserves momentum balance is obtained. ii) The majority of thermalized ions and their energy cross the LCFS on ion loss orbits and are deposited in the SOL near the outboard midplane. The lost ions are predominantly ctr-current, producing a co-current intrinsic rotation of the remaining ions in the edge plasma. iii) While the contribution of the leading order parallel viscosity to toroidal momentum damping vanishes identically in axisymmetric plasmas, non-axisymmetric radial B-fields in the edge plasma enable parallel viscosity to enhance the damping of toroidal rotation.

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