Abstract Submitted
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Prediction of Pressure and Temperature Gradients in the Tokamak Plasma Edge.[1] W.M. STACEY, Georgia Tech — An extended plasma fluid theory [1,2] that takes into account kinetic ion orbit loss and electromagnetic forces in the continuity, momentum and energy balances, as well as atomic physics and radiation, has been used to reveal the explicit dependence of the temperature and pressure gradients in the tokamak edge plasma on these various factors. Combining the ion radial momentum balance and the Ohm's Law expression for E_r reveals the dependence of the radial ion pressure gradient on VxB forces driven by radial particle fluxes, which depend on ion orbit loss, and other factors. The strong temperature gradients measured in the H-mode edge pedestal could certainly be associated with radiative and atomic physics edge cooling effects and the strong reduction in ion and energy fluxes due to ion orbit loss, as well as to the possible reductions in thermal diffusivities that is usually assumed to be the cause. 1) W. M. Stacey, Nucl. Fusion 57(2017) 066034; 2) Contrib. Plasma Phys.56m 495 (2016).

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