The ∇B Drift Effect, Sawteeth, and the H–mode Power Threshold Scaling[1] T.N. CARLSTROM, K.H. BURRELL, R.J. GROEBNER, F.L. HINTON, G.M. STAEBLER, D.M. THOMAS, General Atomics — Because the H–mode transition takes place at the plasma edge, it is believed that the power flow across the separatrix, P_{SEP}, is important in determining the threshold power. Cross field fluxes due to the ∇B drift effect and the heat pulse associated with a sawtooth crash are two mechanisms that can influence this power. We have modeled the equivalent power due to these effects and find that they contribute significantly to the total P_{SEP}. It is proposed that the observed scaling of the power threshold, P_{TH}, is strongly influenced by these effects. In experiments performed with the ion ∇B drift away from the x-point (reverse B), P_{TH} is 2–3 times larger than for the ion ∇B drift toward the X–point (forward B). This is attributed to the cross field fluxes changing sign with the ∇B drift direction. Transitions triggered by sawteeth show an almost linear dependence of P_{TH} on the toroidal field, B. However, P_{TH} in discharges where the sawteeth were suppressed showed almost no dependence on B. Including the ∇B and sawteeth effects, a simple scaling of the power threshold is derived. This model predicts a much lower threshold power for ITER than a simple power law regression of the database.

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