Abstract Submitted
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Kinetic shielding of magnetic islands in 3-D equilibria[1] C.C. HEGNA, University of Wisconsin — Kinetic theory is employed to calculate corrections to analytic predictions of saturated magnetic islands due to pressure gradients in 3-D magnetic configurations. The theory calculates the dominant trapped particle response to 3-D field induced net bounce averaged radial drifts. The associated kinetic response describes plasma currents that flow within magnetic surfaces. In general, these currents have a component that resonates with the helical angle of the magnetic island and affect saturated island sizes through the parallel currents generated to satisfy quasineutrality. The resulting kinetic response generally opposes the effects of singular Pfirsch-Schlüter currents that arise at the rational surfaces of general 3-D MHD equilibria. Accounting for both the MHD and kinetic responses, self-consistent magnetic island widths are calculated using Ampere's law. The kinetic effect is largest at lowest collisionality suggesting high-β stellarators are more resilient to retaining flux surface integrity at high-temperatures than predictions from conventional MHD based theory would imply.

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