

Thermal ion orbit loss and radial electric field in DIII-D

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Abstract. A relatively simple model for the generation of the radial electric field, E_r , near the outboard boundary in a tokamak is presented. The model posits that E_r is established to supply the return current necessary to balance the thermal ion orbit loss current. Comparison with DIII-D data is promising. Features of the model that promote a more negative edge E_r are higher ion temperature, lower density, lower impurity ion content, and a shorter pathlength for orbit loss. These scalings are consistent with experimentally established access to the high-confinement mode edge transport barrier.

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