Abstract Submitted
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Rotation of tokamak halo currents[1] ALLEN BOOZER, Columbia University, New York, NY 10027 — Halo currents, which can be tenths of the total plasma current, flow at the plasma edge along the magnetic field lines that intercept the chamber walls. Non-axisymmetric halo currents are required to maintain force balance as the plasma kinks when the edge safety factor drops to about two in a vertical displacement event. The plasma quickly assumes a definite toroidal velocity $v_a(r)$ with respect to the magnetic kink, where $v_a(r)$ is determined by the radial electric field required for ambipolarity. The plasma velocity near the edge is set by interaction with neutrals or by the radial derivative of the electric potential in the halo required for quasi-neutrality on open magnetic field lines, so the magnetic kink tends to rotate. If the magnetic field lines of the halo plasma intercept the wall at locations of very different electrical conductivity, the toroidal rotation of the halo currents can intermittently lock, as seen in experiments, at wall locations of high conductivity though the toroidal velocity of the magnetic kink itself is essentially smooth. A major concern cited by ITER engineers is that the time varying force of the rotating halo could substantially increase the disruption loads on in-vessel components.

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Allen Boozer
Columbia University, New York, NY 10027

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