Abstract Submitted
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Toroidal Ampere-Faraday Equations Solved Simultaneously with CQL3D Fokker-Planck Time-Evolution[1] R.W. (BOB) HARVEY, YU.V. (YURI) PETROV, CompX, C.B. FOREST, Univ. of Wisconsin-Madison, R.J. LA HAYE, General Atomics — A self-consistent, time-dependent toroidal electric field calculation is a key feature of a complete 3D Fokker-Planck kinetic distribution radial transport code for f(v,theta,rho,t). We discuss benchmarking and first applications of an implementation of the Ampere-Faraday equation for the self-consistent toroidal electric field, as applied to (1) resistive turn on of applied electron cyclotron current in the DIII-D tokamak giving initial back current adjacent to the direct CD region and having possible NTM stabilization implications, and (2) runaway electron production in tokamaks due to rapid reduction of the plasma temperature as occurs in pellet injection, massive gas injection, or a plasma disruption. Our previous results assuming a constant current density (Lenz' Law) model[1] showed that prompt "hot-tail runaways" dominated "knock-on" and Dreicer "drizzle" runaways; we perform full-radius modeling and examine modifications due to the more complete Ampere-Faraday solution. Presently, the implementation relies on a fixed shape eqdsk, and this limitation will be addressed in future work. [1] R.W. Harvey, V.S. Chan, et al., Physics of Plasmas 7, 4590 (2000).

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