Abstract Submitted
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Finite Orbit Width versions of the CQL3D code: Hybrid-FOW and Full-FOW[1] YU. V. PETROV, R.W. HARVEY, CompX — Finite-Orbit-Width (FOW) effects are being added into the CQL3D bounce-averaged Fokker-Planck code [1] using two main options. In the Hybrid-FOW option, partial FOW capabilities are implemented which add FOW features into the particle source (NB) operator, RF quasilinear operator, diagnostics, and guiding center orbit losses with gyro-radius correction. Collisions remain Zero-Orbit-Width (ZOW). The Hybrid-FOW version provides a greatly improved agreement with signals measured by the NSTX Fast Ion Diagnostic [2]. The advantage of the Hybrid-FOW version is that run time increases by only a factor of two compared to ZOW runs. The Full-FOW option further adds neoclassical radial transport features into the FP coding. The collisional coefficients are averaged along guiding center orbits, with a proper transformation matrix from local coordinates to the midplane coordinates, where the FP equation is solved. All radial terms are included. The computations are parallelized in velocity-grid index, typically using 128 CPU cores. We emphasize that this theory includes nonthermal and full-orbit, not first order correction, neoclassical theory.

[1] R.W. Harvey and M. McCoy, "The CQL3D Fokker Planck Code," www.compxco.com/cql3d
[2] R.W. Harvey, Yu. Petrov, D. Liu, W. Heidbrink, P. Bonoli, this mtg (2012)

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