Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

CQL3D Simulations of Suppression of Impurity-Induced Current Quench Using LH Current Drive in C-Mod[1] R.W. HARVEY, YU.V. PETROV, CompX, P.T. BONOLI, S. SHIRAIWA, MIT, P.B. PARKS, General Atomics — In C-Mod lower hybrid current drive experiments (LHCD), Reinke [1] has examined rare discharges which undergo an abrupt thermal quench (TQ) to low Te due to radiation from incoming tungsten flake material. Surprisingly, the TQ did not lead to a runaway electron (RE) current quench (CQ) which normally would be expected to follow the TQ. Rather, the plasma toroidal current continued at its pre-TQ value without large enhancement of the toroidal electric field, implying the LH is instrumental in maintaining the current. We simulate the driven LHCD and compare with experiment using the CQL3D Fokker-Planck code [2] with GENRAY ray tracing and LH collisional damping, based on experimental traces of the background densities, temperatures, Zeff, and one-turn voltage. Self-consistent internal toroidal electric field is included. A major problem for this theory to explain is how the very large spectral gap between the c_light/2 injected LH wave and the post TQ plasma with Te <50 eV, is filled, thereby driving LH current? [1] M.L. Reinke, S. Scott, R. Granetz, et al, Nucl. Fusion 59 066003 (2019). [2] R.W. Harvey and M.G. McCoy, "The CQL3D Fokker Planck Code," www.compxco.com/cql3d.html.

[1]Supported by USDOE grants DE-SC0018090, ER54744, and DE-SC0016452.

R.W. Harvey
CompX International

Date submitted: 03 Jul 2019 Electronic form version 1.4