Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Bringing global gyrokinetic turbulence simulations to the transport timescale using a multiscale approach[1] JEFFREY PARKER, LYNDA LODESTRO, LLNL, DANIEL TOLD, Max-Planck-Institut fur Plasmaphysik, Garching, GABRIELE MERLO, UCLA, LEE RICKETSON, ALEJANDRO CAMPOS, LLNL, FRANK JENKO, UCLA, JEFFREY HITTINGER, LLNL — Predictive whole-device simulation models will play an increasingly important role in ensuring the success of fusion experiments and accelerating the development of fusion energy. In the core of tokamak plasmas, a separation of timescales between turbulence and transport makes a single direct simulation of both processes computationally expensive. We present the first demonstration of a multiple-timescale method coupling global gyrokinetic simulations with a transport solver to calculate the self-consistent, steady-state temperature profile. Initial results are highly encouraging, with the coupling method appearing robust to the difficult problem of turbulent fluctuations. The method holds potential for integrating first-principles turbulence simulations into whole-device models and advancing the understanding of global plasma behavior.

[1]Work supported by US DOE under Contract DE-AC52-07NA27344 and the Exascale Computing Project (17-SC-20-SC)

Jeffrey Parker
Lawrence Livermore Natl Lab

Date submitted: 14 Jul 2017 Electronic form version 1.4