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**Gyrokinetic study of plasma transport and global profile evolution in stochastic magnetic fields** MIN-GU YOO, WEIXING WANG, EDWARD STARTSEV, CHENHAO MA, STEPHANE ETHIER, Princeton Plasma Physics Laboratory, XIANZHU TANG, Los Alamos National Laboratory — First-principles-based calculation of plasma transport in given stochastic magnetic fields has been developed for a global gyrokinetic simulation code GTS to confront specific challenges of thermal quench transport issues in tokamak disruption modeling. A novel delta-f particle approach and a new field solver for the 3-dimensional gyrokinetic Poisson equation enable an effective and accurate simulation of nonlinear evolution of the global plasma profiles in the stochastic magnetic fields. We emphasize the consistent coupling of electron and ion dynamics through transport ambipolarity induced electric field which plays a critical role in determining plasma transport in such systems. The electric fields slow down and enhance the parallel transports of the electrons and ions, respectively, so the ambipolar rarefaction waves propagate from the edge to the core. At the same time, the established potential in the stochastic layer produces strong ExB vortices that mix the plasma across the stochastic field lines resulting in faster radial transports. As a result, we observed a rapid degradation of the global plasma profile within several milliseconds that agrees with the typical time scale of the thermal quench.

Min-Gu Yoo
Princeton Plasma Physics Laboratory

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