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Evolving magnetic equilibria in anomalous turbulent transport simulations JUNGPYO LEE, ANTOINE CERFON, NYU CIMS, EDMUND HIGHCOCK, MICHAEL BARNES, Oxford University, Rudolf Peierls Centre for Theoretical Physics, UK — The evolution of poloidal and toroidal magnetic fluxes in a tokamak are determined by Faraday's law in which electric field needs to be consistent with 1-D radial transports of density, temperature, and toroidal angular momentum. Consistency is required because the transport of the thermodynamic variables depends on the 2-D magnetic equilibrium that changes depending on the radial pressure profile. For neoclassical transport, consistency is achieved through a proper treatment of the parallel electric field and Ohm's law [Hinton and Hazeltine, (1976), Hirshman and Jardin (1979)]. Recently, consistency for the anomalous turbulent transport has been studied analytically using a Lagrangian formulation of gyrokinetics [Sugama et. al. (2014)]. In this poster, we propose a simple numerical model to evolve both the magnetic equilibrium and the radial profile of density, temperature, and toroidal angular frequency due to turbulent transport with a fixed q (safety factor) profile. The constraint of fixed q profile makes the evolution self-consistent only if the transport time scale is much smaller than the resistive current diffusion time scale. In this model, we use the transport code TRINITY coupled with the local gyrokinetic code GS2 and the q-solver version of the Grad-Shafranov code ECOM.

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