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Kinetic Boltzmann modeling of neutral transport for a continuum gyrokinetic code[1] T.N. BERNARD, Oak Ridge Associated Universities, M. FRANCISQUEZ, MIT Plasma Science and Fusion Center, N.R. MANDELL, Princeton University, A. HAKIM, Princeton Plasma Physics Laboratory, F.D. HALPERN, General Atomics, G.W. HAMMETT, Princeton Plasma Physics Laboratory — Gyrokinetic (GK) models are increasingly being applied to the edge and scrape-off layer (SOL) of tokamaks in order to improve the description of parallel transport, trapped particles, and orbit loss effects that cannot be rigorously modeled in fluid models. Neutral interactions such as electron-impact ionization, charge exchange, and radiation play an important role in setting the plasma profiles, and it is necessary to include these to improve GK modelling of SOL plasmas. We describe a coupled continuum model for two gyrokinetic plasma species and a 5D (2X3V) monoatomic neutral species using the Gkeyll code. Our neutral model includes, so far, electron-impact ionization and charge exchange effects. The choice of a continuum model avoids the statistical noise and challenging convergence associated with hybrid continuum–Monte-Carlo codes. We present results from basic verification tests and describe progress towards realistic simulations of open-field-line turbulence in fusion devices.

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