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Development of a 1.5D plasma transport code for coupling to full orbit runaway electron simulations[1] J.D. LORE, D. DEL CASTILLO-NEGRETE, L. BAYLOR, L. CARBAJAL, ORNL — A 1.5D (1D radial transport + 2D equilibrium geometry) plasma transport code is being developed to simulate runaway electron generation, mitigation, and avoidance by coupling to the full-orbit kinetic electron transport code KORC [1]. The 1.5D code solves the time-dependent 1D flux surface averaged transport equations with sources for plasma density, pressure, and poloidal magnetic flux, along with the Grad-Shafranov equilibrium equation for the 2D flux surface geometry. Disruption mitigation is simulated by introducing an impurity neutral gas 'pellet', with impurity densities and electron cooling calculated from ionization, recombination, and line emission rate coefficients. Rapid cooling of the electrons increases the resistivity, inducing an electric field which can be used as an input to KORC. The runaway electron current is then included in the parallel Ohm's law in the transport equations. The 1.5D solver will act as a driver for coupled simulations to model effects such as timescales for thermal quench, runaway electron generation, and pellet impurity mixtures for runaway avoidance. Current progress on the code and details of the numerical algorithms will be presented. [1] L. Carbajal, et al, Phys. Plasmas 24, 042512 (2017).

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