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Modeling and Simulation of Runaway Electron Dissipation by Impurity Injection Using KORC MATTHEW BEIDLER, DIEGO DEL-CASTILLO-NEGRETE, DON SPONG, LARRY BAYLOR, Oak Ridge National Laboratory — Runaway electrons (REs) generated during a disruption pose an existential threat to ITER and future high current tokamaks. The most mature technique for mitigating the effects of REs is the injection of high-Z impurities into the post-disruption RE beam via shattered pellet injection (SPI). The impurities provide additional free and bound electrons that scatter REs through Coulomb collisions, where both elastic pitch angle scattering and inelastic slowing down play an essential role in the evolution and decay of the RE current and energy. In this work, we study this problem using the Kinetic Orbit Runaway electrons Code (KORC). KORC evolves a general initial distribution of REs along full and guiding-center orbits in a toroidal geometry with Monte-Carlo collisions, electric field acceleration, and radiation damping. Calculations are performed using analytical and experimentally reconstructed electromagnetic fields and plasma profiles in the post-disruption, RE plateau phase. We present a comparative study of different RE collisional dissipation models along with an assessment of the role played by spatially-dependent orbit effects and the self-consistent evolution of the electric field. Preliminary comparisons with SPI dissipation experiments will also be discussed.

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