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KORC: A Kinetic Orbit Runaway Electrons code for tokamak disruptions[1] LEOPOLDO CARBAJAL GOMEZ, DIEGO DEL-CASTILLO-NEGRETE, DONALD SPONG, SUDIP SEAL, LARRY BAYLOR, Oak Ridge National Laboratory — Runaway electrons (RE) resulting from the violent termination of tokamak plasmas pose a serious threat to ITER due to the very high energies they can reach and deposit on the plasma facing components. Most of the current modelling of RE in fusion tokamak plasmas rely on reduced models such as the bounce-average and the test particle equations. In some scenarios, the radiation losses in these models might lead to uncertainties in the RE parameters that determine their confinement and energy limit. In order to study this in detail we have developed a new Kinetic Orbit Runaway electrons Code (KORC). KORC follows the dynamics of ensembles of relativistic electrons in the 6D phase space fully resolving gyro-motion under the influence of the Lorentz force, the Landau-Lifshiftz consistent formulation of the Abraham-Lorentz-Dirac force for radiation damping, and collisions with impurities and the background plasma. KORC is parallelized using open MP/MPI, and benefits from a modified relativistic leap-frog method along with an operator splitting scheme for solving the RE dynamics in different magnetic fields. The code is robust, conservative, and shows nearly linear strong scaling.

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