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A hybrid simulation model for runaway electron interaction with the tearing mode CHANG LIU, DYLAN BRENNAN, Princeton University, ALLEN BOOZER, Columbia University — The runaway electron problem is one of the key issues in disruption studies. It is predicted that in future large tokamak devices like ITER the runaway beam can be significantly large and energetic, which can cause serious damage to the device. In experiments increasing magnetic turbulence can suppress runaway electrons, which is due to the increase of runaway electron radial transport when the magnetic fields become stochastic. On the other hand, a large amount of runaway current can change the MHD stability, causing MHD instabilities, which can affect the magnetic field structure. It is therefore important to study the interaction of runaway electrons and MHD instabilities self-consistently. We are working towards a hybrid simulation using a drift-kinetic, Monte-Carlo particle code for the runaway electrons and NIMROD for the background plasma. Our simulation will be self-consistent, which means it will include a coupling of the runaway electrons to the MHD equations through the current. The kinetic simulation of the runaway electrons, even uncoupled from the MHD, can be used to analyze existing experiments on runaway electrons. In addition, we present a self-consistent fluid treatment of the runaway current coupled to MHD, which captures much of the essential physics.

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