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Numerical study of the non-linear interaction of runaway electrons and MHD during cold VDEs and in stochastic fields[1] V. BANDARU, M. HOELZL, Max Planck Institute of Plasma Physics, F.J. ARTOLA, ITER Organization, G. PAPP, Max Planck Institute of Plasma Physics, G.T.A. HUIJSMANS, CEA Cadarache and Eindhoven University of Technology — The runaway electron (RE) fluid model in the MHD code JOREK is applied to study the nonlinear interaction of REs and MHD activity during ITER cold VDEs and during the formation of stochastic fields. The fluid model treats REs as a seperate species, with its density evolved taking into account the Dreicer, hot-tail via initial distribution and avalanche generation as well as RE transport. ITER cold VDE simulations with REs show a significant slowing down of the vertical motion due to the formation of REs and the possibility of internal kink modes being destabilized due to q falling below unity in the core of the plasma. The presence of REs also leads to a significantly different dynamics of the 3D mode structure during the VDE. To study RE-MHD interaction in a stochastic field, we use a diffusion model to mimic the fast radial loss of REs, thereby avoiding the numerical limitations in advecting REs with speed of light. The implications and efficacy of this approach will be discussed.

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