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Progress in Tokamak Disruption Simulation (TDS) SciDAC Project[1] XIANZHU TANG, Los Alamos Natl Lab, TDS SCIDAC COLLABORATION — The Tokamak Disruption Simulation (TDS) SciDAC project aims to develop the physics basis for effective disruption mitigation. For the coupled nature of thermal quench and current quench, during which there can be a robust Ohmic-to-runaway current conversion, a key focus of TDS project is to understand the connection of thermal quench and runaway current conversion, under the mitigation approaches currently considered for ITER, which is based on impurity injection. Here we give an overview of TDS' efforts in (1) understanding the two primary channels for thermal quench: radiative cooling by externally introduced high-Z impurities and plasma transport in stochastic magnetic fields that have open field lines connection the fusion core to the divertor/first wall; (2) understanding the Ohmic-to-runaway current conversion physics in the presence of impurity injection of various compositions. To explore additional ways for disruption, particularly the runaway mitigation, TDS also has the efforts that aim to establish the physics underlying how interactions of runaways with plasma waves and 3D magnetic fields can facilitate runaway energy control and the subsequent mitigation of first wall damage.

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