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Kinetic effects of energetic particles on a 2/1 resistive MHD instability in a DIII-D discharge D.P. BRENNAN, University of Tulsa, C.C. KIM, University of Washington, R.J. LA HAYE, General Atomics — The kinetic effects energetic particles have on the stability of the m/n=2/1 tearing mode in a DIII-D discharge are investigated as a function of q_{min}, β, S=τ_R/τ_A and $\beta_{frac} = \beta_h/\beta$ (β_h is energetic particle β). Using experimental equilibrium reconstructions as a basis we generate a series of equilibria varying q_{min} and β. The non-ideal MHD stability of the n=1 mode is then calculated including the δf kinetic-MHD model in the 3-D extended MHD code NIMROD. The particle distribution models the slowing-down distribution from neutral beams in experiment. The interaction between the particles and the mode drives a real frequency and changes the linear stability. For the range of ideal unstable, resistive unstable and MHD stable modes, this drive is analyzed in phase space with particle diagnostics. In the ideal unstable regime at low q_{min}, the particles damp the mode. However, it is observed that in the MHD-only stable regime, the interaction is strong near the axis, and can cause destabilization of the n=1 mode. These results are compared with experimental data, which includes low amplitude n=1 and 2 in a nonlinearly saturated state.

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