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Energetic Ion Effects on Tearing Mode Stability in Tokamak Equilibria MICHAEL HALFMOON, Univ of Tulsa, DYLAN BRENNAN, Princeton University — The 2/1 tearing mode is found to be damped or stabilized by energetic ions in a slowing down distribution, where the interaction between the ions and the mode is similar to their interaction in ideal MHD, which has been extensively studied. This damping effect is mainly due to trapped particle precession resonance and causes the tearing mode to have a finite real frequency. This study focuses on the pressure-driven, slow growing tearing modes; which are the first modes to be driven unstable as pressure increases. The layer physics modifies the mode interaction, and affects the frequency of the mode. In these simulations, a series of equilibria with fixed safety factor and varying pressure are analyzed using a δf hybrid-kinetic MHD code in NIMROD. Our equilibrium consists of a D-shaped poloidal cross section, a peaked pressure profile, and safety factor with finite shear to the magnetic axis. Also, a high aspect ratio toroidal model based on Hu & Betti's work is investigated analytically to gain insight to the physics of mode-particle interactions. We combine our computational and analytic tools in an effort to explain this damping and stabilizing effect.

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