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Dependency of Tearing Mode Stability on Current and Pressure Profiles in DIII-D Hybrid Discharges[1] K. KIM, SNU/ORAU, J.M. PARK, M. MURAKAMI, ORNL, R.J. LA HAYE, General Atomics, Y-S. NA, SNU; DIII-D Team — Understanding the physics of the onset and evolution of tearing modes (TMs) in tokamak plasmas is important for high-β steady-state operation. Based on DIII-D steady-state hybrid experiments with accurate equilibrium reconstruction and well-measured plasma profiles, the 2/1 tearing mode can be more stable with increasing local current and pressure gradient at rational surface and with lower pressure peaking and plasma inductance. The tearing stability index Δ', estimated by the Rutherford equation with experimental mode growth rate was validated against Δ' calculated by linear eigenvalue solver (PEST3); preliminary comprehensive MHD modeling by NIMROD reproduced the TM onset reasonably well. We present a novel integrated modeling for the purpose of predicting TM onset in experiment by combining a model equilibrium reconstruction using IPS/FASTRAN, linear stability Δ' calculation using PEST3, and fitting formula for critical Δ' from NIMROD.

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