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Analysis of Ideal Stability Limits in DIII-D Discharges with High β_N and ℓ_i,* J.R. Ferron, T.C. Luce, *GA*; C.T. Holcomb, *LLNL*; J.M. Park *ORNL*; W.M. Solomon, *PPPL* – Broad pressure profiles in DIII-D discharges with high ℓ_i enable stable access to high plasma pressure. As β_N increases, the pressure peaking factor $f_p=P(0)/\langle P\rangle$ decreases, from $f_p\approx3.7$ at $\beta_N\approx2.9$ to $f_p\approx2.4$ at $\beta_N>4.5$. Simultaneously, the ideal low-n stability limits calculated with a conducting wall increase from $\beta_N\approx3.6$ to nearly 6, so that β_N remains below the limit. In addition, f_p decreases as ℓ_i is increased. Thus, the high β_N stability limits result from both increased ℓ_i and decreased f_p. In a steady-state discharge, though, increased β_N will limit the practical value of ℓ_i because of the increase in the bootstrap current density, particularly in the H-mode pedestal. Reducing the pedestal pressure with an n=3 magnetic perturbation increases ℓ_i but also increases f_p so there is no net increase in the β_N limit. A change in the discharge shape to reduce the pedestal pressure, to the single-null divertor ITER shape from a double-null, results in an ≈15% drop in the β_N limit.

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