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A Conformal Conducting Wall for Robust Stability of High β_N, Fully Noninductive Discharges in DIII-D[1] J.R. FERRON, GA, J. BIALEK, J. HANSON, G. NAVRATIL, Columbia U., J.M. PARK, ORNL — A conducting surface inside the DIII-D vacuum vessel, closer to the plasma, can increase the ideal-wall MHD stability limit above the high normalized beta (β_N) needed for 100% noninductively-driven current at power plant relevant q_{95}. In discharges modeled with the planned heating/current drive upgrades, the required β_N is as high as 5. This is roughly the calculated limit for n = 1 ideal-wall stability, even with a broad current density profile designed to couple well to the present conducting wall. Tearing and resistive wall modes will very likely limit β_N to a value that is lower, but which is expected to scale with the ideal-wall limit. Conceptual designs for an axisymmetric wall that better matches the plasma shape raise the ideal-wall stability limited β_N above 7. Analysis with VALEN of a 3-D wall model predicts $\beta_N \sim 6.4$. Increased stability margins are also expected for a wide range of DIII-D discharge scenarios even without a broad current density profile.

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