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Beta Limiting Instabilities in Negative Central Shear Discharges[1] A.D. TURNBULL, E.J. STRAIT, L.L. LAO, M.S. CHU, R.L. MILLER, T.S. TAYLOR, C.M. GREENFIELD, R.J. LA HAYE, R. SNIDER, *General Atomics*, B.W. RICE, *Lawrence Livermore National Laboratory*, E.A. LAZARUS, *Oak Ridge National Laboratory*, G. NAVRATIL, *Columbia University* — Performance in transiently generated high beta Negative Central Shear (NCS) discharges in DIII–D is limited by MHD instabilities. With L–mode edge conditions, the uncontrolled density peaking results in catastrophic MHD disruptions near $\beta_N \sim 2$. With a transition to H–mode prior to disruption, higher peak β can be reached, but the steady-state β is limited by edge MHD activity which results in a saturation and steady decline in performance. Several MHD instabilities are believed to be relevant in the various regimes. In the catastrophic disruptions, the discharges appear to be near to ideal and resistive global stability limits and to localized resistive interchange limits. In the H–mode discharges, the MHD activity appears to be related ideal kink and ballooning instabilities. Identification of the various instabilities using DIII–D diagnostics and detailed stability analysis, is now possible. The roles of the various instabilities and routes to improved performance will be discussed.

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Alan D. Turnbull
Alan.Turnbull@gat.com
General Atomics

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