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Stability of Super Dense Core plasmas in the Large Helical Device[1] J.H. HARRIS, R. SANCHEZ, Oak Ridge National Laboratory, N. OHYABU, K. WATANABE, National Institute of Fusion Science, LHD TEAM — Recent experiments [N. Ohyabu et al, Phys. Rev. Lett, in press] using pellet injection into reduced-recycling discharges in the Large Helical Device have yielded Super Dense Core (SDC) plasmas with very peaked density profiles, high central density $\sim$ 4.5 x 10^{20} m^{-3}, and improved confinement. We have examined ideal MHD stability of these SDC configurations the using the 3-D COBRA stability code [R. Sanchez et al, Comp. Phys. Comm **141**, 55 (2001)]. These calculations show that the core region inside the zero-shear radius has direct access to second stability, i.e., the stability margin increases with β. Outside the zero-shear radius, the plasma becomes unstable to ballooning modes at average β $\sim$3-4%. Of course, resistive versions of the modes are expected to appear at lower β. These MHD effects may play a role in improving core confinement, and may also provide a useful mechanism to constrain the plasma pressure in the outer plasma region and thus help maintain the favorable SDC state.

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