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Analysis of MHD instabilities limiting high normalized beta operation in KSTAR[1] Y.S. PARK, S.A. SABBAGH, J.W. BERKERY, J.M. BIALEK, Columbia University, S.W. YOON, J. KIM, Y.M. JEON, J.G. BAK, W.H. KO, S.H. HAHN, Y.K. IN, M.J. CHOI, S.G. LEE, J.G. KWAK, Y.K. OH, NFRI, Korea, H.K. PARK, UNIST, Korea, G.S. YUN, POSTECH, Korea, S.C. JARDIN, PPPL — H-mode plasma operation in KSTAR reached high normalized beta up to 4.3 that significantly surpassed the computed n =1 ideal no-wall beta limit by a factor of 1.6. Pulse lengths at maximum normalized beta were extended to longer pulses by new, more rapid equilibrium control resulting in normalized beta greater than 3 sustained for 1 s. Analysis of these plasmas shows that low-n global kink/ballooning or resistive wall modes (RWMs) were not the cause of the plasma termination. Kinetic modification of the ideal MHD n =1 stability criterion computed by the MISK code shows the kinetic RWM to be stable, which is consistent with the observed high normalized beta operation. An m/n =2/1 tearing mode onsets at high normalized beta greater than 3 that experimentally reduces normalized beta by more than 30%. The stability of the observed 2/1 tearing mode examined by using the M3D-C[1] code coupled with the EFIT reconstruction shows a stable 2/1 mode while the equilibrium is experimentally unstable to the 2/1 mode This result may imply that the mode is classically stable, and the pressuredriven neoclassical terms dominate over the current gradient term. Advances in the analysis from the recent run campaign will be reported.

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