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Formation of a High Pressure Staircase Pedestal with Suppressed Edge-Localized-Modes in the DIII-D Tokamak ARASH ASHOURVAN, RAFFI NAZIKIAN, W GUTTENFELDER, SR HASKEY, BA GRIERSON, Princeton Plasma Physics Laboratory, J CANDY, D ELDON, CC PETTY, E BELLI, General Atomics, GR MCKEE, U Wisconsin, C LASNIER, Lawrence Livermore National Laboratory — We observe the formation of a high-pressure two-step staircase pedestal ($\approx$ 16-20 kPa) in the DIII-D tokamak when large amplitude Edge-Localized-Modes are suppressed using resonant magnetic perturbations. The pedestal oscillates between the staircase and a single step structure every 40-60 ms, correlated with oscillations in the heat and particle flux to the divertor. Gyrokinetic analysis using the CGYRO code shows that when the heat and particle flux to the divertor decreases, the pedestal broadens and the EB shear at the mid-pedestal decreases, triggering a transport bifurcation from Kinetic-Ballooning-Mode (KBM) to Trapped-Electron-Mode (TEM) limited transport that flattens the density and temperature profiles at mid-pedestal and results in the formation of the staircase pedestal. The reverse transition from staircase to one-step pedestal takes place as the heat and particle fluxes to the divertor increase. Our results suggest that in the reactor-scale tokamaks for which the efficacy of ExB shear is reduced (e.g. ITER), enhanced ion-scale transport can be locally contained with the formation of staircase pedestal, leading to the increase in pedestal pressure and improved confinement.

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