Modification of H-mode threshold power via the variation of outer strike point location

Y. MA, J.W. HUGHES, R.M. CHURCHILL, B. LIPSCHULTZ, B. LABOMBARD, C. LAU, E.S. MARMAR, ALCATOR C-MOD TEAM — In a recent Alcator C-Mod experiment performed in $B_T=5.4\text{T}$, $I_p=0.9\text{MA}$, $\langle n_e \rangle =1.3-1.6\times10^{20}\text{m}^{-3}$, lower single null plasmas, the required power for H-mode access ($P_{th}$) was found to be greatly reduced as the outer strike point was lowered along the vertical plate and onto the horizontal floor of the divertor. The reduction can be as much as a factor of 3. The $P_{th}$ is found to primarily correlate with the poloidal distance between X-point and the outer strike point, or outer leg length (OLL), such that the magnitudes of $P_{th}$ generally decrease with increased OLL. Despite the large variation of $P_{th}$, the electron temperature ($T_e$) and density ($n_e$) profiles inside the separatrix are seen to be not dramatically different. The roles of neutrals, ion temperature and rotation in the plasma edge and SOL, and SOL ne profiles will be assessed in an attempt to reveal the reason for the experimental observations. Supported by US DoE Award DE-FC02-99-ER54512.

Y. Ma
MIT PSFC

Date submitted: 18 Jul 2011