Lower Hybrid Wave Induced SOL Emissivity Variation at High Density on the Alcator C-Mod Tokamak

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Lower Hybrid Current Drive (LHCD) in the Alcator C-Mod tokamak provides current profile control for the generation of Advanced Tokamak (AT) plasmas. Non-thermal; electron bremsstrahlung emission decreases dramatically at $\bar{n}_e > 1 \cdot 10^{20}$ [$m^{-3}$]) for diverted discharges, indicating low current drive efficiency. It is suggested that Scrape-Off-Layer (SOL) collisional absorption of LH waves is the cause for the absence of non-thermal electrons at high density[1]. VUV and visible spectroscopy in the SOL provide direct information on collision excitation processes. Deuterium Balmer-, Lyman- and He-I transition emission measurements were used for initial characterization of SOL electron-neutral collisional absorption. Data from Helium and Deuterium LHCD discharges were characterized by an overall increase in the emissivity as well as an outward radial shift in the emissivity profile with increasing plasma density and applied LHCD power. High-temperature, high-field (Te = 5 keV,Bt = 8T) helium discharges display increased non -thermal signatures as well as reduced SOL emissivity. Variations in emissivity due to LHCD were seen in SOL regions not magnetically connected to the LH Launcher, indicating global SOL effects due to LHCD. Work supported by USDOE awards DE-FC02-99ER54512 and DE-AC02-76CH03073.

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