Comparison of upstream T_e profiles with downstream heat flux profiles and their implications on parallel heat transport in the SOL in DIII-D

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Abstract

In the DIII-D tokamak, we measure the downstream target plate heat flux with an IRTV camera and relate it to Thomson and Langmuir probe profile measurements of n_e and T_e in the scrape-off layer (SOL) by projecting all measurements to the out-board midplane in order to assess the competition between parallel and cross-field heat transport. We analyze the measured characteristic widths associated with the SOL and model the results with the UEDGE code to provide insight into the mechanisms defining the various widths and the implications they have on transport.

Analysis of the scaling of the heat flux width reveals an essentially inverse dependence on I_p. The B_t dependence is extremely weak to non-existent. No dependence was found on the shear and normalized pressure gradient at the 95% flux surface (s_{95}, α_{95}), nor on P_{sol}, n_e or P_{inj}.

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