

Far Scrape-Off Layer and Near Wall Plasma Studies in DIII-D*

D.L. Rudakov^a, J.A. Boedo^a, R.A. Moyer^a, N.H. Brooks^b, R.P. Doerner^a, T.E. Evans^b, M.E. Fenstermacher^c,
M. Groth^c, E.M. Hollmann^a, S. Krasheninnikov^a, C.J. Lasnier^c, M.A. Mahdavi^b, G.R. McKee^d, A. McLean^e,
P.C. Stangeby^e, W.R. Wampler^f, J.G. Watkins^f, W.P. West^b, D.G. Whyte^d, and C.P.C. Wong^b

^a*University of California, San Diego, La Jolla, California 92093-0417, USA*

^b*General Atomics, San Diego, California 92186-5608, USA*

^c*Lawrence Livermore National Laboratory, Livermore, California 94550, USA*

^d*University of Wisconsin, Madison, Wisconsin 53706, USA*

^e*University of Toronto Institute for Aerospace Studies, Toronto, M3H 5T6, Canada*

^f*Sandia National Laboratories, Albuquerque, New Mexico 87185-1129, USA*

Far scrape-off layer (SOL) and near-wall plasmas are studied in DIII-D using Langmuir probes and a number of optical diagnostics. The data obtained in lower and upper single-null (LSN and USN) diverted and inner-wall limited (IWL) configurations are presented. Far SOL plasma parameters depend strongly on the configuration and confinement regime. In L-mode cross-field transport increases with average discharge density and flattens far SOL profiles, thus increasing plasma-wall contact. In H-mode between edge localized modes (ELMs), plasma-wall contact is generally weaker than in L-mode. During ELMs plasma fluxes to the wall increase to, or above the L-mode levels. A significant fraction (up to 60%) of the net cross-field fluxes is convected through the SOL by large amplitude intermittent transport events. In low density L-mode intermittent events quickly thermalize with the background plasma, slow down and decay before they reach the outer wall. In high density L-mode and during ELMs in H-mode intermittent events get to the wall and may cause sputtering. Plasma conditions in the lower divertor in USN and IWL configurations were found to be comparable to those near the outer wall. Based on this finding, a Divertor Material Evaluation System (DiMES) probe containing samples of several ITER-relevant materials has been exposed to a series of USN discharges as a proxy to measure the first wall erosion.

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