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Comparative Study of C I Line Profiles Resulting from Methane Puffing in the DIII-D Divertor, with those from Surface Sputtering[1]
N.H. BROOKS, W.P. WEST, C.P.C. WONG, General Atomics, A.G. MCLEAN, U. Toronto, D.L. RUDAKOV, UCSD — Outstanding discrepancies between the expected temperature of carbon atoms generated by plasma breakup of hydrocarbons and that actually measured in DIII-D under conditions in which chemical sputtering dominates [1] are investigated by the controlled injection of methane through a porous plug [2]. Surprisingly, the methane injection yields an effective temperature <1 eV, rather than the several eV anticipated from modeling the breakup dynamics of the injected CH_4 molecule. At a spot at the same major radius as the porous plug but toroidally displaced, an asymmetric C I profile, characteristic of physical sputtering, is observed; this profile is significantly broader than that in the puff. The buildup of a soft C:D film on the face of the porous plug is explored as a possible explanation for the anomalously narrow C I profile on the spectrometer channel viewing the porous plug. [1] R.C. Isler et al., Phys. Plasmas **8**, 4470 (2001). [2] A.G. McLean et al., this conference.

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