Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Strong Suppression of Net Erosion of Graphite at Divertor Targets Due to Prompt Local Deposition Caused by the Strong Electric Field of the Magnetic Pre-sheath[1] P.C. STANGEBY, U. Toronto — A new analysis is presented of the effective thickness of the magnetic pre-sheath, L_{MPS}, for prompt deposition due to the strong E-field in the MPS. The gross erosion rate at divertor strike points in future devices such as ITER, FDF, etc. will be extremely high. It is long recognized, however, that net erosion can be much smaller, at least for high-Z PFCs such as W, due to prompt deposition which occurs when the ionization distance of the sputtered neutral, λ_{iz}, is much less than its ion larmor radius, ρ_Z. This latter process tends not to be effective for low-Z PFCs like C; however, prompt local deposition can still occur if $\lambda_{iz} < L_{MPS}$, which is of order ρ_{DT}. It is shown that L_{MPS} is a actually a function of the sputtered neutral energy, E_0, e.g. $L_{MPS} \sim 6\rho_{DT}$ for $E_0 = 0.4kT_e$. It is shown that for plasma conditions typical of divertor strike locations in ITER and FDF that the net erosion of graphite can be expected to be much less than gross erosion.

[1]Supported by Collaborative Research Opportunities Grant from the National Sciences and Engineering Research Council of Canada.

P.C. Stangeby
U. Toronto

Date submitted: 17 Jul 2010 Electronic form version 1.4