Abstract Submitted
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Edge Plasma Properties for HHFW Heating on NSTX[1] J. HOSEA, R.E. BELL, B.P. LEBLANC, C.K. PHILLIPS, G. TAYLOR, J.R. WILSON, PPPL, E.F. JAEGER, P.M. RYAN, J. WILGEN, ORNL, AND THE NSTX TEAM — HHFW core plasma heating efficiency in helium discharges is found to improve markedly on NSTX when the density at the antenna is below that for the onset of perpendicular wave propagation ($n_{onset} \propto B^* k_{||}/\omega$). Lithium wall conditioning has resulted in lower edge density in deuterium discharges giving substantial improvement in core heating for 90^o antenna phase and the first significant core heating for 30^o. Since core wave damping is so high in NSTX, the observed RF power losses in the plasma edge are driven in the vicinity of the antenna. PDI surface losses account for $\sim$ 16% - 25% of the lost power assuming the power is lost via ion collisions with the electrons. Spectroscopic measurements suggest that energetic edge ions could also be lost on direct loss orbits, especially when propagating field amplitudes are peaked up near the antenna (lower $k_{||}$). The implication of this loss process for explaining the resilience of edge rotation to NBI during HHFW heating and as an important loss mechanism to include in advanced RF codes will be discussed.

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