Effect of Toroidicity on Fast Fuel Relocation in Tokamaks,* P.B. Parks, GA and L.R. Baylor, ORNL – Three mechanisms have been identified [1], that extend our previous theory on $E \times B$ advection of ablation cloudlets: 1) Efficient cloudlet acceleration by the centrifugal force, stemming from $M \sim 1$ parallel flows, lengthens the drift distance. 2) Because of the twist in the magnetic field lines (rotational transform), the transverse electric field $E$, frozen into the field lines, rotates with respect to the vertical grad-B drift direction with increasing distance along the field lines inside the cloudlet, reducing penetration slightly. 3) A differential drift velocity results from a reorientation of the polarization charge layers due to a finite magnetic shear length $L_s = qR/s$. The end parts of the cloudlet lag behind the moving electrostatic field, causing mass shedding and fuel dispersal. Theory and experimental $\Delta n$ profiles agree for both HFS and LFS pellet injection on DIII-D. Deep fueling is possible in ITER with $v_{pel} \sim 300$ m/s.


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