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Experimental evidence of local ExB drift in the divertor plasma influencing the upstream density profile[1] HQ WANG, HY GUO, AW LEONARD, DM THOMAS, TH OSBORNE, D ELDON, GA, M GROTH, UAlto, AE JAERVINEN, LLNL, JG WATKINS, SNL, PC STANGEBY, UToronto, GS XU, L WANG, XQ WU, JC XU, JB LIU, ASIPP — Local flattening of the radial profile of the upstream density near the magnetic separatrix has been observed in DIII-D H-mode plasmas with unfavorable Bt. The density plateau is correlated with a double-peaked density profile near the divertor plate, connected via 2D ExB drifts. Simulations show that near the sheath entrance the strong radial electric field induced by the radial temperature gradient leads to a supersonic parallel flow. To maintain the parallel pressure balance, the increased dynamic pressure causes a strong static pressure drop along the field line, thus generating a valley in the density profile near the plate. In addition, the poloidal electric field resulting from the static pressure loss enhances the density in the far SOL, leading to the observed double-peak density profile. Upstream of the divertor target, drifts lead to a reversal of the total poloidal flow in the main SOL, which causes formation of the density plateau. The density plateau is correlated with divertor conditions and can be greatly enhanced with peak density in the main SOL comparable to that at the pedestal top.

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