# Changes in Edge and Scrape-off Layer Plasma Behavior Due to Variation in Magnetic Balance in DIII–D*

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We report on recent experiments in which the magnetic balance of highly triangular ($\delta \approx 0.8$), unpumped H–mode plasmas was systematically varied. To quantify "magnetic balance," we define a parameter $dR_{sep}$, which is the radial distance between the upper divertor separatrix and the lower divertor separatrix, as determined at the outboard midplane. The direction of the $\nabla B_T$ ion particle drift in this experiment was toward the lower divertor, and $dR_{sep}$ ranged from –2.0 cm (i.e., well-formed lower single-null [SN]) to +2.0 cm (i.e., well-formed upper SN).

This paper focuses on identifying systematic changes in the edge plasma, the inboard scrape-off layer (SOL) plasma, and the outboard SOL plasma, as a function of $dR_{sep}$. While values of edge plasma density (as well as its entire radial profile), energy confinement time, and impurity content were insensitive to change in magnetic balance for $-2.0 \text{ cm} \leq dR_{sep} \approx 0$ cm, a 15%–30% drop in these quantities was observed when the magnetic balance shifted to the upper SN shape. Changes in type-1 ELMing behavior with $dR_{sep}$ may be at least partially responsible. However, the electron and ion temperature radial profiles were little affected by changes in $dR_{sep}$. The particle flux at the inner divertor target was much more sensitive to magnetic balance than the particle flux at the outer divertor target. "Between ELM" Langmuir probe measurements at the divertor targets indicate that the particle flux e-folding widths at the inboard targets were about one-half those of the outboard targets near DN($dR_{sep} \cong 0$). These measurements also suggest that the electron densities in the scrape-off layer were much lower near the inboard midplane separatrix than near the outboard midplane separatrix, approximately by a factor of three. UEDGE modeling of these data will be presented. The above results suggest important advantages for the balanced DN over the SN configurations, e.g., more efficient use of volume near the centerpost and easier fueling of the core plasma.

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