Effect of Diamagnetic and ExB Drifts on Divertor Plasma Flows

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Abstract

Due to the influence of the diamagnetic and $\mathbf{E} \times \mathbf{B}$ drifts affecting the inertia term in the plasma momentum equation a strong variation of the plasma pressure along the magnetic field lines can appear similar to experimental observations of the "detached divertor" regimes. Thus, drift effects can be considered as an alternative physical mechanism of divertor plasma detachment. Drifts can play an especially important role when the mechanism of plasma detachment employing plasma-neutral interaction becomes ineffective e. g. low density plasmas transparent to the neutrals or for large (ITER scale) tokamaks where the efficiency of neutral-wall interaction is considerably reduced.