The influence of blobs on neutral particles in the scrape-off layer - DTU Orbit (08/11/2017)

The influence of blobs on neutral particles in the scrape-off layer

Interactions between plasma and neutrals are investigated with particular attention to the influence of large amplitude blob structures that mediate a significant particle and energy transport through the scrape-off layer (SOL). We perform a statistical analysis of the mean-field approximation for plasma parameters in the SOL, and this approximation is shown to be poor in a SOL with a high level of fluctuations, as the plasma fields are strongly correlated. A 1D neutral fluid model which account for both cold and hot neutrals is formulated and the effects of blobs on the ionization in the SOL and edge are investigated. Simulations suggest that neutrals originating from dissociation of hydrogen molecules only fuel in the outermost edge region of the plasma, whereas hot neutrals from charge exchange collisions penetrate deep into the bulk plasma. The results are recovered in a simplified 2D model.

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