**Impurity behavior under puff-and-pump radiating divertor conditions**

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**Abstract.** The effectiveness of the puff-and-pump technique to enrich a seeded impurity in the divertor relative to the core and, thereby, to maximize radiation in the divertor depends sensitively on both the magnetic geometry and the ion \( B \times VB \) drift direction. In the puff-and-pump scenario used here, argon impurities injected into the private flux region are inhibited from accumulation in the core plasma by enhanced plasma flows to the divertor created by a combination of deuterium gas puffing upstream of the divertor targets and particle pumping near the divertor targets. Modeling of single-null, H-mode plasmas with the UEDGE fluid transport code indicates that particle drifts in the scrape-off layer and divertor strongly affect the locations where the argon seed impurity accumulates. It is also found in double-null cases that argon always shows a larger accumulation in the divertor out of which the ion \( B \times VB \) drift is directed, regardless of the divertor into which the argon is injected. Experiments have shown that the degree to which the deuterium gas-puffing rate inhibits the escape of the seed impurity from the divertor(s) depends critically on the direction of the ion \( B \times VB \) drift and on whether the plasma is single-null or double-null. The transition in behavior from double-null to single-null character during puff-and-pump occurs for \(|dRsep|=0.4 \text{ cm}\) when the ion \( B \times VB \) drift was pointing away from the dominant divertor. The lowest argon density buildup in the main plasma of any of the configurations studied during puff-and-pump was achieved in single-null plasmas with the ion \( B \times VB \) drift direction away from the divertor.

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