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Diagnosing Slot Divertors For Physics Understanding[1] D THOMAS, T ABRAMS, H GUO, A LEONARD, A MOSER, H WANG, GA, C LASNIER, A MCLEAN, C SAMUELL, LLNL, M SHAFER, R WILCOX, ORNL, J WATKINS, SNL, J BOEDO, UCSD, J REN, UTK, E HINSON, UWisc — Here we examine specific diagnostic requirements and strategies for closed divertor geometries needed to validate models of divertor dissipation. A slot geometry with its increased closure can achieve improved divertor performance with respect to increased energy dissipation and detachment dynamics at lower upstream densities, as recently demonstrated using the SAS divertor on DIII-D (Guo NF 2019). The physics behind this behavior is complex, representing an intimate coupling of particle retention, plasma drifts, divertor magnetic geometry, and neutral flux recycling from the target surfaces. This environment is difficult to model accurately given the limitations of existing codes (SOLPS-ITER, UEDGE), setting a premium on good diagnostic measurements. Key parameters include (but are not limited to) plasma temperature and density, heat and particle flux, and neutral particle distributions. Spatial resolutions are set by the dissipation scale, which can be comparable to the slot dimensions. Unfortunately, the small solid angle and poor access make these measurements very challenging to deploy. We will discuss these measurement requirements, compare them with the existing SAS diagnostic suite, and suggest improvements for planned upgrades (SAS-1VW, SAS-2) on DIII-D.

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