Contribution ID: **280** Type: **Poster**

SOL Effects on the Pedestal Structure in DIII-D Discharges

Wednesday, 19 October 2016 08:30 (4 hours)

Core transport models predict that fusion power scales roughly as the square of the pressure at the top of the pedestal, so understanding the effects that determine pedestal structure in steady-state operational scenarios is important to project steady-state tokamak operational scenarios developed in DIII-D to ITER and other devices. Both experiments and modeling indicate that SOL conditions are important in optimizing the pedestal structure for high-beta steady-state scenarios. The SOLPS code [1] is used to provide interpretive analysis of the pedestal and SOL to examine the impact of flows and fueling on the pedestal structure, including the effects of drifts in the fluid model. This analysis shows that flows driven by the ∇B drift are outward when this drift is toward the x-point (favorable ∇B direction) and inward when the drift is away from the x-point (unfavorable ∇B direction). It is hypothesized that these flows will decrease the density gradient in the pedestal in the favorable direction, thereby stabilizing the KBM and increasing the pedestal width. Comparisons of pedestal structures in similarly shaped DIII-D steady-state plasmas confirm this change, showing increased density pedestal width but lower peak density with favorable drift direction. The pedestal temperature is higher in the lower density case, indicating that the change in particle confinement does not impact energy confinement. Modeling of cases with constant ∇B drift but changing between the more open lower divertor and more closed upper divertor show that there is increased fueling inside the pedestal with the more open geometry. The cases with increased pedestal fueling show increased pedestal height with similar pedestal width. The pedestal fueling rate for both attached and detached cases is always lower with more closed divertor geometry than in any cases with more open geometry.

This work is supported by the U.S. DOE under DE-AC05-00OR22725, and DE-FC02-04ER54698.

[1] Schneider R., et al., Contrib. Plasma Phys. 46 (2006) 3.

Paper Number

EX/P3-26

Country or International Organization

United States

Primary author: Dr SONTAG, Aaron (Oak Ridge National Laboratory)

Co-authors: MOSER, A.L. (General Atomics); LEONARD, A.W. (General Atomics); PETTY, C.C. (General Atomics); LORE, J.D. (Oak Ridge National Laboratory); PARK, J.M. (Oak Ridge National Laboratory); CANIK, John (Oak Ridge National Laboratory); MURAKAMI, M. (Oak Ridge National Laboratory); CHEN, Xi (Genreral Atomics)

Presenter: Dr SONTAG, Aaron (Oak Ridge National Laboratory)

Session Classification: Poster 3

Track Classification: EXS - Magnetic Confinement Experiments: Stability