DPP12-2012-000616

Abstract for an Invited Paper
for the DPP12 Meeting of
the American Physical Society

**Edge Sheared Flows and Blob Dynamics**[1]

J.R. MYRA[2], Lodestar Research Corporation

The dynamics of blob-filaments [S. I. Krasheninnikov, et al. J. Plasma Phys. 74, 679 (2008); D. A. D'Ippolito, et al., Phys. Plasmas 18, 060501 (2011)] in the strongly radially inhomogeneous edge and scrape-off-layer (SOL) region of a tokamak plasma is considered, with emphasis on sheared flow generation and interaction. The work is motivated by the potential importance of edge sheared flows for turbulence regulation, (e.g. the L-H transition), and the influence of flows on the character of emitted blob-filament structures which ultimately contact plasma-facing components. To study the dynamics of blobs and sheared flows, we employ both numerical simulations and experimental data analysis. The simulations use the fluid-based 2D curvature-interchange model embedded in the SOLT (SOL turbulence) code [D. A. Russell, et al, Phys. Plasmas 16, 122304 (2009)]. A blob-tracking algorithm has also been developed and applied to NSTX and Alcator C-Mod data. The algorithm is based on 2D time-resolved images from the gas puff imaging (GPI) diagnostic [S. J. Zweben, et al. Phys. Plasmas 9, 1981 (2002)]. The algorithm is able to track the blob motion and changes in blob structure, such as elliptical deformations, that can be affected by sheared flows. Results of seeded blob simulations are compared with the experimental data to determine the role of plasma parameters on the blob tracks and to evaluate the exchange of momentum between the blobs and flows. Seeded blob simulations are shown to reproduce many qualitative and quantitative features of the data including size, scale and direction of perpendicular (approximately poloidal) flows and the inferred Reynolds forces, poloidal reversal of blob tracks, and blob trapping and/or ejection. Simulation and experimental data comparisons permit the inference of dynamical mechanisms associated with blob motion and sheared flow generation in these shots, and their relation to previous theoretical work.

[1]Work supported by USDOE grants DE-FG02-97ER54392, DE-FG02-02ER54678, DE-AC02-09-CH11466, DE-FC02-99ER54512, DE-AC02-09CH11466, and PPPL subcontract S009625-F.

[2]In collaboration with W. M. Davis, D. A. D'Ippolito, B. LaBombard, D. A. Russell, J. L. Terry and S. J. Zweben.