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**Comparison of radial measurements of ion velocity using Mach Probes, TDE and LIF in the linear magnetized device CSDX** TY LEE, SAIKAT CHAKRABORTY THAKUR, MIN XU, PETER MANZ, NICOLAS FEDORCZAK, JONATHAN YU, GEORGE TYNAN, DUSTIN MCCARREN, EARL SCIME — Previous experimental studies carried out in the Controlled Shear Decorrelation Experiment (CSDX) plasma device demonstrated the existence of an azimuthally symmetric radially sheared plasma fluid flow (i.e., a zonal flow). These measurements were based on time delay estimation (TDE) between two spatially separated Langmuir probes and Mach probes. While TDE measurements cannot distinguish between ion fluid velocities and phase velocities, Mach probes are perturbative. Laser induced fluorescence (LIF) is a non-perturbative, spatially resolved diagnostic technique that, in CSDX, provides direct measurement of the velocity distribution function (VDFs) of argon ions. The bulk ion velocity and ion temperature are determined from fits to the measured VDFs. For the LIF measurements in these experiments, we used an amplified tunable diode laser at 668.6139 nm (vacuum wavelength), the wavelength required for a three-level LIF scheme in Ar II that begins with a metastable ion state. Here we report detailed comparisons of the radial profiles of azimuthal ion velocity in CSDX using all the three diagnostics.

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