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Effect of ion mass on transition to drift-zonal flow turbulence in the Controlled Shear Decorrelation eXperiment[1] RONGJIE HONG, SAIKAT THAKUR, GEORGE TYNAN, Center for energy research, UC San Diego — The Controlled Shear De-correlation eXperiment (CSDX) is a helicon plasma device dedicated to studies of drift wave turbulence, zonal flow interaction and generation of intrinsic rotation in a cylindrical plasma configuration. Previous studies in argon plasma demonstrated existence of a weak turbulence driven azimuthally symmetric, radially sheared plasma flow [1]. More recent studies at higher B field with larger plasma size have shown the coexistence of radially separated multiple instabilities during the transition to strongly developed plasma turbulence [2]. To better understand the underlying mechanism and the role of the drift wave turbulence in the formation of the zonal shear layer and of the spatially separated multiple instabilities, we study the effects of the ion mass to further vary the effective system size via the parameter (L_n/ρ_s). Using an upgraded RF power source, we have achieved high-density helicon plasmas in gases such as argon, neon, helium, deut erium and hydrogen in CSDX. Therefore, the impact of the ρ_s and isotope effect on turbulent transport, including the energy transfers and self-organization mechanisms between turbulence and sheared flows, will be addressed.

[1] GR Tynan et al 2006 PPCF
[2] SC Thakur et al 2014 PSST

[1]CMTFO - # DE-SC0008378, MIT - #DE-SC0010593

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