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Parametric study of shear flow in a linear magnetically confined plasma device[1] ZHENG YAN, GEORGE TYNAN, JONATHAN YU, CHRISTOPHER HOLLAND, GHASSAN ANTAR, Department of Mechanical and Aerospace Engineering, University of California, San Diego, La Jolla CA 92093,USA — 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). This flow was shown to be sustained by the Reynolds stress against viscous damping in an Argon plasma with 3mTorr gas pressure and 1000 Gauss magnetic field. Previous studies have also shown that the magnetic field is an effective parameter in controlling the transition to plasma turbulence. A study of the evolution of zonal flow shearing rate for different plasma parameters, such as gas pressure and magnetic field, is carried out, with the specific aim of assessing whether the shear flow remains in self-consistent force balance with the Reynolds stress and collisional damping. In this work, a fast-framing imaging camera is used to infer time-average velocity field of plasma fluctuations, and a multi-tip Langmuir probe for measuring the Reynolds stress.

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Zheng Yan
Department of Mechanical and Aerospace Engineering,
University of California, San Diego, La Jolla CA 92093

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