

Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

On the Statistical Properties of the Turbulent Reynolds Stress

ZHENG YAN, GEORGE TYNAN, JONATHAN YU, CHRIS HOLLAND, STEFAN MULLER, MIN XU, Center For Energy Research — Statistical properties of the turbulent Reynolds stress has been studied on the CSDX linear device. The strongest power of the turbulent Reynolds stress is located near the maximal density gradient region, and the cross-phase between the turbulent radial and azimuthal velocity fields determines the shape and the amplitude of the Reynolds stress, and hence the shear flow generation. The PDF of the turbulent ion-saturation current shows that density bursts are born in the vicinity of the shear layer. Joint PDF between the turbulent ion-saturation current, turbulent radial and azimuthal velocity fields and Reynolds stress are computed, as well as the time-averaged vorticity fields, which allows the study of the relation between the formation of blobs of enhanced plasma density in the far edge region, the behavior of the Reynolds stress, its cross-phase and cross-coherence, generation of bursty radially going azimuthal momentum transport events, and the formation of the large-scale shear layer.

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Date submitted: 23 Jul 2007

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