

Abstract Submitted
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Studies of turbulence and fast ion interactions in TORPEX simple magnetized plasmas¹ A. FASOLI, I. FURNO, K. GUSTAFSON, D. IRAJI, B. LABIT, J. LOIZU, G. PLYUSHCHEV, P. RICCI, CH. THEILER, EPFL-CRPP, Association Euratom - Swiss Confederation, Lausanne, Switzerland — We present high resolution data together with fluid models and numerical simulations, which advance the understanding of electrostatic turbulence and its effect on transport of bulk plasma and fast ions in the TORPEX simple magnetized device. The dominant instabilities are determined by the ratio of the vertical magnetic field to the toroidal field. For $B_v/B_T > 3\%$, ideal interchange instabilities are observed, which nonlinearly develop radially propagating blobs. The radial blob velocity is limited by cross-field ion polarization currents and by parallel currents to the sheath in the small and large blob size limits, respectively. The effect of the blobs on the particle, heat and toroidal momentum transport are investigated in detail and complemented by data from a fast framing camera coupled to an image intensifier and a movable gas puff system. The effect of turbulence on fast ions is studied using movable fast ion source and detector in the interchange dominated regime. A theory validation project is conducted, based on comparisons of observables that are defined identically in the 2D and 3D simulations and in the data.

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