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Doppler-reflectometry at W7-X: Initial results from the campaign OP2.1

Wednesday 15 May 2024 14:00 (30 minutes)

For the Wendelstein 7-X operation phase OP2.1 the Doppler-reflectometry (DR) systems have been upgraded significantly. Steerable mirrors allow for beam steering perpendicular to the local magnetic field to enhance the measured $k_\perp$-range and to investigate flow asymmetries and the poloidal localization of microinstabilities. The operation of three synced DR systems with ordinary mode polarization at two different toroidal positions is used to investigate the radial correlation of fluctuations and to characterize zonal flow components.
In this contribution, inital results from the OP2.1 campaign are presented. For various magnetic configurations and different heating scenarios the measured radial electric field is compared against neoclassical predictions and the measured backscattered power is analyzed and compared to linear growth rate calculations. The observation of edge localized MHD modes is investigated in detail during a rotational transform scan. The diagnostic resolution, sensitivity and limitation is investigated by means of full-wave simulations using CUWA [1]. The input data for CUWA is taken from nonlinear Gene-3D simulations [2] with realistic experimental profiles with kinetic electrons and imposed neoclassical radial electric field. The simulaton data is analyzed to disentangle the low-k contributions of ion temperature gradient-trapped electron mode turbulence.

[1] P Aleynikov, NB Marushchenko, Comp. Phys. Com., 241, 40 (2019).
[2] F. Wilms, et al. J. Plasma Phys. 87 , 905870604 (2021).

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