Effect of Static Stochastization Fields on Electromagnetic Fluid Drift Turbulence in TEXTOR-DED

D. Reiser, B. Scott, T. Haberscheidt

[a] Institut für Plasmaphysik, Forschungszentrum Jülich GmbH,
EURATOM Association, Trilateral Euregio Cluster,D-52425 Jülich, Germany

[b] Max-Planck-IPP, EURATOM Association, D-85748 Garching, Germany

Fluid drift turbulence is considered as a major ingredient of the so called anomalous transport in magnetically confined plasmas, causing a deterioration of confinement properties by a strong radial transport. This work gives an introduction into the theory of small scale drift turbulence relevant for the plasma edge of present fusion devices. The technical option to ergodize magnetic fields in fusion relevant tokamak experiments by externally induced magnetic perturbation fields offers the opportunity to influence drift instabilities and therefore the turbulent behaviour of plasmas. We employ the DALF3 code to perform non-linear three-dimensional turbulence simulations. This code uses the most basic model containing the principal interactions of dissipative drift wave physics, represented by a four-field model describing the non-linear evolution of small scale fluctuations of the electric potential $\widetilde{\phi}$, the density $\widetilde{n}$, the parallel magnetic potential $\widetilde{A}_{\|}$ and the parallel ion velocity $\widetilde{u}_{\|}$. Results are presented, illustrating the effect of magnetic islands due to single mode perturbation fields and the changes in the turbulent transport for scenarios with multi-mode perturbations (stochastization). These results are compared to experimental results measured at TEXTOR-DED. The question of a suppression of ballooning mode dominated turbulence and it's relevance for Edge Localized Modes (ELMs) will be addressed.