Contribution ID: **229** Type: **Poster**

EX/P7-04: Turbulence Wave Number Spectra Reconstruction from Radial Correlation Reflectometry Data at Tore Supra and FT-2 Tokamaks

Friday, October 12, 2012 8:30 AM (4 hours)

Radial correlation reflectometry (RCR) [1] is a microwave scattering technique for measuring the properties of electron density fluctuations in tokamaks. The coherence decay of two scattering signals with growing difference of probing frequencies is studied by the diagnostic to determine the turbulence radial wave number spectrum and the turbulence correlation length.

As it was shown already in 1D numerical computations performed in Born approximation [2], the scattering signal cross correlation function (CCF) decays spatially much more gradually than the turbulence CCF. This slow decay of RCR CCF was attributed to the contribution of small angle scattering off very long scale fluctuations. Later this observation was confirmed also in 2D analytical study [3] and in full-wave 1D numerical modeling [4] for small level of turbulent density fluctuations. Recently a new theoretical approach [5] shows that in the case of linear density profile the turbulence spectrum can be expressed in terms of the ordinary mode RCR CCF using the integral transformation.

In the present work we perform the results of the proposed theoretical method application to extract turbulence characteristics from experimental data obtained at Tore Supra and FT-2 tokamaks. The radial wave number spectrum and its correlation length as well as spatial turbulence correlation function have been successfully determined. The quality of reconstruction has been proved by numerical simulations for various spectra in conditions relevant to experiment (see also [6]). We also discuss the limitations of the method, and possible application to ITER.

[1] N Bretz 1992 Physical Fluids B4(8) 2414

[2] H Hutchinson 1992 Plasma Phys. Control. Fusion 34 1225

[3] E Z Gusakov and B O Yakovlev 2002 Plasma Phys. Control. Fusion 44 2525

[4] G Leclert et al 2006 Plasma Phys. Control. Fusion 48 1389

[5] E Z Gusakov and N V Kosolapova 2011 Plasma Phys. Control. Fusion 53 045012

[6] N V Kosolapova, E Z Gusakov and S Heuraux 2011 Plasma Phys. Control. Fusion 54 035008

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Session Classification: Poster: P7

Track Classification: EXC - Magnetic Confinement Experiments: Confinement