Gyrokinetic Turbulence analysis in the FT-2 Tokamak Configuration

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The full f gyrokinetic code elmfire [1] has been developed to study turbulent transport in Tokamak plasmas. The code has been successfully benchmarked to neoclassical theory and other gyrokinetic codes. Experimental benchmarking of the ELMFIRE code is performed in co-operation with the FT-2 tokamak experiment at the Ioffe Institut in St Petersburg. Correlation lengths and times of density fluctuations as well as poloidal velocity and density fluctuation spectra are compared to experimental results from reflectometer diagnostics [2]. In figure 1, the simulated $E_r \times B$ velocity and total poloidal velocity of fluctuations are shown for typical Ohmic FT-2 parameters [3]. It can be concluded that $E_r \times B$ velocity arising from neoclassical and turbulent mechanisms is the main contributor to the poloidal velocity at the inner and outer region of the experiment. At the central region of the simulation, a contribution of mode phase velocity has been found from linear mode analysis, explaining the difference in Figure 1. The angular frequencies and growth rates obtained from the ELMFIRE linear mode analysis have been successfully benchmarked against the eigenvalue code GS2 [4]. Studies of turbulent coherent burst and their transport are performed with orthogonal wavelet techniques.

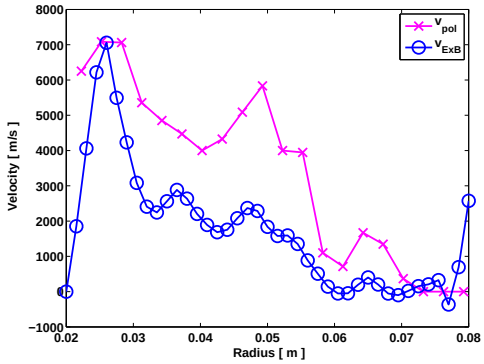

Figure 1: The simulated $E_r \times B$ velocity and total poloidal velocity of fluctuations in FT-2

References

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