

Fast sweeping reflectometry upgrade on Tore Supra

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Progress in understanding turbulence and anomalous transport in tokamak plasmas requires localised measurements of turbulence characteristics, particularly the temporal dynamics and typical scale lengths (e.g. their wave-number k spectrum). In addition to density profile measurement, it has been shown that the fast-sweep reflectometry can provide a radial density fluctuation profile [1]. In order to reach the temporal dynamic of the turbulence, it is necessary that the sweeping time should be shorter than the correlation time, which is estimated to be about 10 μs . Up to now, fast-sweep X-mode reflectometers on Tore Supra were limited to 20 μs sweep time with 5 μs dead time between sweeps. The diagnostic has been upgraded in order to shorten the sweep time down to 2 μs with 1 μs dead time and has been operated on plasma just before the one year tokamak shutdown. Detailed aspects of the upgrade are given relatively to the stability of the ramp generation, the detection set-up and the fast acquisition module using sampling frequency up to 2 GHz. A review of the different studies (velocity measurement of the turbulence, modifications of the wavenumber spectrum, wave front induced by a heating pulse...) offered by such improvements will be presented.

[1] L. Vermare, S. Heuraux, F. Clairet, G. Leclert, F. da Silva, Nucl. Fusion, **46** (2006) S743-S759