Laser Multipass Intracavity Probing System for Thomson scattering of TEXTOR Plasma

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Abstract

A multipulse TV Thomson scattering diagnostics [1] on the TEXTOR tokamak was recently upgraded with a multipass intracavity system [2] to achieve a better accuracy of electron temperature and density measurements. An accuracy of a few percent is required for the study of fast plasma events on TEXTOR, like plasma disruptions, dynamics of the electron energy content at the start of Electron Cylclotron Resonance Heating, dynamics of edge instabilities (socalled ELMs) and rotating islands.

The multipass system consists of two spherical mirrors which force the laser beam to probe the plasma up to 14 times and direct the beam back to the laser active media. This unique system can employ in this way an unsurpassed total effective laser energy of 2.5 kJ, available in 40 pulses at 5 kHz.

The report describes the multipass system in TEXTOR, discusses technical issues as well as presents measurements results obtained with the new system.

[1] H. J. van der Meiden et al. Rev. Sci. Instrum. **75** (2004) 3849
[2] M.Yu.Kantor and D.V Kouprienko. Rev. Scien. Instr, 70 (1999) 780