# REFLECTOMETER MEASUREMENT OF DEFORMATION OF THE PLASMA BOUNDARY BY M.H.D. MODES, IN THE MAST TOKAMAK

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In recent years there has been interest in the distortion of the tokamak plasma boundary by non-axisymmetric magnetic fields, principally as a result of the ability of such fields to modify ELM behaviour - a critical design issue for ITER. Although some direct measurements of this distortion have been made using DC fields [1], it is difficult to make accurate measurement of the departure from symmetry under such conditions. This paper presents measurements on the distortion resulting from low frequency internal MHD activity, and have a resolution better than 1mm. It appears that the measured distortion can readily be reconciled with the perturbed magnetic field at the plasma boundary, which lends confidence when predicting the expected distortion from a given error field. The same method is also used to measure the amplitude of an ELM precursor mode leading up to the non-linear, explosive, phase of the ELM in which filaments are formed.

The measurements depend on the fact that MAST H mode discharges typically have a very steep edge density profile, so that a reflectometer measures the position of the edge with good resolution, rather than the whole profile. The resolution is further enhanced by the use of `absolute phase demodulation', comparing the phase of the IF signal from one sweep to the next, rather than the rate of change of phase within each sweep as is usually done. It is shown that this method is much less susceptible to the Doppler effect than the conventional method.

## References

[1] Chapman et. al. *Perturbation of tokamak magnetic surfaces by applied toroidally asymmetric magnetic fields*. Nucl. Fusion **47** (2007) L36-L40

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