Fast imaging of edge plasma instabilities in the TJ-II stellarator and JET tokamak.

J.A. Alonso, P. Andrew[1], E. de la Cal, P. Carvalho[2], D. Carralero, H. Fernandes[2], T. Happel, C. Hidalgo, G. Kocsis[3], A. Manzanares, B.Ph. van Milligen, A. Murari[4], A. Neto[2], J.L. de Pablos, M.A. Pedrosa, G. Petravich[3], L. Rios, C. Silva[2], H. Thomsen[4] and S.J. Zweben[5].

Asociación EURATOM-CIEMAT, Av. Complutense 22, 28020 Madrid – Spain

[1]*EURATOM-UKAEA Association, Culham Science Center, Abingdom – UK*

[2]*Associação EURATOM-IST, Av. Rovisco Pais, 1049-001 Lisbon – Portugal*

[3]*EURATOM-HAS Association, KFKI-RMKI, H-1525 Budapest-114 – Hungary*

[4]*Max-Planck IPP, Boltzmannstrasse 2D-85748 Garching – Germany*

[5]*Princeton Plasma Physics Laboratory, Princeton, NJ, USA*

High speed visible imaging has become a popular diagnostic in magnetic confinement fusion devices in the last years. Fast commercial cameras provide a time resolution of up to 4 us with image sizes of few tenths of pixels per side. The relatively cold (1-100 eV) plasma edge mainly emits radiation in the visible range and can thus be diagnosed by means of these fast cameras. This work is a summary of the results of high speed visible imaging obtained in the TJ-II stellarator and JET tokamak.

In the TJ-II stellarator the visible radiation is locally increased around the poloidal limiter. The tangential view of the edge region in the vicinity of the limiter revealed the presence of spatially coherent turbulent structures or eddies. We studied the geometrical properties of these structures in plasma regimes with and without edge shear layer [1]. The presence of a shear layer was seen to increase the elongation of turbulent eddies and to reduce the scatter in the direction of the structures' main axis, suggesting that the shear flow in the edge of TJ-II stretches and orders the eddies.

In the JET tokamak a wide-angle view endoscope provides a half torus perspective. This allows the study of large scale instabilities. ELMs and disruptions have been observed at high frame rates (30-210 kfps) for the first time in JET [2]. Ultra high speed recordings of the divertor region in ELMy plasmas provided an estimation of the effective ELM radial velocity. These and other edge plasma observations like wall material sputtering and MARFEs will be presented.

[1] J.A. Alonso *et al*., Plasma Phys. Control. Fus. **48** B465 (2006)

[2] J.A. Alonso *et al*., 34th EPS conference, Warsaw 2007, P1.124