

Tokamak GOLEM for fusion education - chapter 4.

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Tokamak GOLEM has been serving for four years as an educational device for training students in fusion research (see previous three "chapters" - EPS contributions from 2012, 2011, 2010). One of its essential features is that it can be fully operated remotely making it suitable for international experiments. Students are involved in the development of diagnostics which includes density measurements via microwave interferometry, plasma position studies using a set of Mirnov coils, two high-speed cameras and two linear arrays of bolometric diodes. Initial experiments with poloidal field coils wound with the new generation of high temperature superconductors in a tokamak environment have been conducted.

Several innovations of the tokamak performance will be presented at the conference: i) waveguide for microwave pre-ionization at 2.45 GHz, ii) an upgrade of magnetic stabilization by adding an active element – an amplifier of the feedback signals together with a program for evaluating the plasma position in real time, iii) the website which serves as an information platform has been significantly expanded, iv) historical analysis has been added, v) discharges with two types of gas have been successfully performed: hydrogen and helium, and finally vi) a new improved array of 16 Mirnov coils for MHD measurements was installed to detect magnetic islands, as demonstrated in the spectrogram of B_θ fluctuations on one of those coils in Fig. 1. Observed change of detected island frequency correlates with the change in global discharge parameters – B_t variable with time and a short I_p flat top period are features typical for this tokamak and offer a possibility to study dynamic plasma processes.

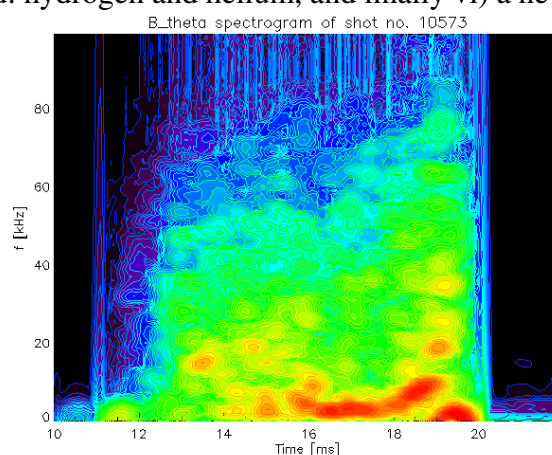


Fig.1: Frequency diagram of MHD activity showing $m/n = 3/1$ magnetic island between 15.5 – 19 ms.

References

- [1] Svoboda, V. et al. Multi-mode Remote Participation on the GOLEM Tokamak. *Fusion Engineering and Design*, 86(6-8):1310–1314, 2011.