ON Calibration stability of the statistical method of registration of weak optical radiation of tokamak near wall plasma against the background of Powerful divertor pulsing radiation

L.I. Ognev 1 and V.S. Lisitsa1,2

1National Research Centre Kurchatov Institute, Moscow, Russia, [liognev@gmail.com](mailto:liognev@gmail.com)  
2Moscow Engineering Physics Institute, Moscow, Russia

The intensity ratio of the divertor radiation to SOL radiation in H-alpha line in modern tokamaks (JET) is about an order of magnitude. In view of the parameters of ITER fusion reactor this ratio may increase to a value of 102 [1]. The method of measuring a weak H-alpha emission edge plasma of a tokamak (SOL), proposed in [2], based on measurements of radiation from two chords on optical dump and radiation reflecting from walls near the dump, followed by interpretation of the difference signal  (Fig. 1a). Therefore, the accuracy of measurement of the cross section of the beam of radiation may be crucial to the result. A feature of the method [2] is that the calibration process of the optical dump reflectivity  is conducted in the same arrangements, which measured the SOL radiation, but using a high-frequency intensity modulation of diverter background radiation . Therefore, if you imagine that the inaccuracy of the measurement section, say a beam reflected from the dump *I2*, leads to a coefficient, the reflection coefficient α from the dump will be calculated with the same ratio as compared to the true value. As a result the weak SOL radiation will differ only by the same error calibration factor of the beam. As a simplifying assumption can be assumed that the radiation divertor and SOL, are not only statistically independent, but differ in the frequency range of temporal fluctuations (Fig. 1b), choosing to calibrate the dump rapid pulsation missing in the SOL .

High

Freq

SOL

divertor

***I1***

Fig. 1. Normalization of the radiation beams from the dump *I2* and the chamber wall of a tokamak *I1*(a); time spectra of radiation pulsations slow SOL and fast from divertor  (b).

References

1. Andreenko E. N., Alekseyev A. G., Gorshkov A. V., 2014 Optical Dumps for H-alpha and visible spectroscopy in ITER AIP Conference Proceedings **1612,** 171
2. Ognev L.I., Lisitsa V.S., To the problem of edge plasma spectra recording with a background of powerful reflected radiation from a divertor, 9th conference "Modern means of plasma diagnostics and application", At MEPHI, 5-7 nov. 2014, Moscow, Russia, p. 26