DYNAMIC METHOD OF REGISTRATION OF SOL LINES AGAINST THE BACKGROUND OF INTENSIVE DIVERTOR RADIATION

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The problem of registration of hydrogen isotopes Balmer lines in near wall tokamak plasma (SOL) appeared more complicated after estimates of background resulted from reflected intense optical radiation of divertor plasma. Related to parameters of thermonuclear reactor ITER intensity ratio of divertor radiation to SOL radiation in line H-alpha can increase to the value 102.

In publication [1] optical dump (absorption cavity near wall) was proposed. Method [2] was based on reversed problem of recovering of SOL signal with the help of data of measurement along different chords including that was directed to the divertor. Parallel registration of the radiation reflected from dump and wall (“dual chord” scheme) improves stability of the method. In this work a new method for detection of small SOL signal is proposed with the scheme of optical dump [2] (“dual chord”) based on statistical independence of background fluctuations and measured signal. The method is based on compare of intensities of radiation of two beams – reflected by attenuating dump and by tokamak wall . Since both of the beams include weak radiation of neutral atoms  of near wall plasma (SOL), weak signal .

The light reflection coefficient by dump  can be calculated with time averaged power of high frequency fluctuations of divertor radiation in beams reflected by light dump and by wall of the . Due to observations of helium spectra [3] the frequencies of such fluctuations can reach 100 kHz.

The uncertainty of calculating  is caused by statistical variations of reflection coefficient of dump , wich can be estimated within the model of white noise with Gaussian statistics [4]. By choosing pulsation band of optical background in the region of acoustic frequencies we can achieve . Taking into account the smallness  we obtain . With [1] sensitivity of the method is .

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