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P2.1009 Modification of SXB method for hydrogen isotopes in ITER main chamber

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See full abstract here
http://ocs.ciemat.es/EPS2019ABS/pdf/P2.1009.pdfAn analysis is carried out of the possibility of using the high-resolution spectroscopy (HRS)
data, specifically, the asymmetry of the spectral line shape of the radiation emitted in the Balmer-alpha lines of hydrogen isotopes, to recover the flux of neutral hydrogen atoms and molecules from the tokamak first wall to the SOL plasma in real time measurements. To this end, a new method is proposed, which generalizes the well-known SXB method [1, 2], widely used for recovery the impurity atoms/ions fluxes from wavelength-integrated spectral line measurements, to the case of hydrogen. The proposed modification is motivated by the impossibility of reliable interpretation of molecular spectra in the ITER main chamber because of a strong background light from the divertor. The method makes it possible to replace the equation corresponding to the DXB method for molecular spectra with another equation using the relation between the asymmetry of the line shape of spectral intensity and the atomic flux density. The method uses atomic and molecular flux density profiles, simulated [3] with the modified Ballistic Model [4]. The modified SXB method is tested by comparing the results with the data for deuterium neutral atom velocity distribution in the SOL from the EIRENE code [5] stand-alone simulations [6] on the background plasma modeled by the SOLPS code [7] with extended to the wall numerical mesh [8], for six modelled types of the SOL plasma profiles in ITER (these data were used in synthetic H-alpha diagnostics [9] based on solving a multiparametric inverse problem). The limitations of the method are discussed, including the problem [9] of selecting the HRS signal from the SOL under condition of a strong divertor stray light in ITER.
References
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