# Simulation and Experimental Test Research on Hydrogen/Deuterium-α Visible Spectra Diagnosis Based on HL-2A Tokamak

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As a priority diagnosis in the tokamak fusion device, the hydrogen-α and visible spectroscopy could measure the distribution of impurities and hydrogen/deuterium densities in the divertor and scraping of layers. In the divertor and scraping layer area, firstly, because the divertor and the wall regions' strong light reflection, directly and accurately measure the region of impurities (helium, carbon, tungsten, etc.) and hydrogen/deuterium distribution becomes difficult. Secondly, the strong magnetic field leads to the existence of Zeeman splitting in the visible spectrum of this region, and the magnetic field is different in edge locations, results in Zeeman splitting different. Based on this, the hydrogen-α and visible spectrum diagnosis system of HL-2A were established. The visible emission spectra were measured and fitted by simulation and experimental researches. The Zeeman Effect was used to distinguish the reflected light information at different positions, thereby accurately impurities, hydrogen/deuterium in the divertor and scraping layer could be obtained for spatial and temporal distribution. It is important to study the steady-state operation of the fusion device ITER and CFETR by measuring the correlation result under different experimental discharge conditions, carrying out the constraint mode conversion, the fuel cycle, the impurity and the plasma interaction researches. The author would thank Dr. Manfred for the discussion of the test work on JET and design work for the ITER using Zeeman paten to resolve the reflection light error on edge Dα diagnostics.