**Development of a Vertical Edge Thomson Scattering Diagnostic on HL-2M Tokamak**

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A vertical edge Thomson scattering diagnostic system on HL-2M tokamak has been developed recently. A Nd: YAG laser (1064 nm, 0.6 ~ 2 J, 30 Hz, 15 ns) is used as the probe beam. The laser beam propagates vertically through the plasma region and the scattered light is observed horizontally. The combination of a half-wave plate and a polarized beam splitter is used for stray light suppression. Characteristics of the non-ideal Gaussian laser beam is studied in detail. A group of collection lens is designed to image the 400 mm scattered region onto the rectangular fiber arrays. The laser beam waist and vertical spatial resolution are 2 mm and 10 mm, respectively. Scattered light is imaged on the 2.20 mm × 2.86 mm (10 × 13) fiber optic bundle. The development of in-vessel collection optics with a special designed safety shutter ensures a reliable scattered signal, where the solid angle at central field of view is 0.018 sr. A compact polychromator (Width 482 cm × Height 8.8 cm) is developed to measure the scattered light. The noise level of each channel is less than 5 mV. Relative calibration of the filter response (1060 nm, 1052 nm, 1029 nm and 982 nm) and absolute calibration by nitrogen Raman scattering have been completed. In the 2022 plasma campaign of HL-2M, the measured plasma density is as low as 1.2×1018 m-3 at E0 = 1.2 J, confirming the capability of the system for pedestal measurement in the future H-mode campaign.

Keywords: Thomson scattering; Non-ideal Gaussian laser beam; Polychromator