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4.54 Four-dimensional calibration turntable of the motional Stark effect diagnostic on EAST

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The motional Stark effect (MSE) diagnostic is applied to measure the safety factor q and current density profile of a tokamak device, which are important parameters in realizing the high-performance and long-pulse steady state of a tokamak. A single-channel MSE diagnostic based on photoelastic modulators (PEMs), whose sightline meets with the neutral beam injection at a major radius of R = 2.12 m, has been built for the D window of the Experimental Advanced Superconducting Tokamak (EAST). According to the requirements of MSE diagnostic polarimetric calibration, a high-precision four-dimensional calibration turntable, driven by four stepping motors and controlled by upper computer software, was designed for EAST. The turntable allows us to rapidly calibrate the MSE diagnostic in a series of positions and angles during EAST maintenance. The turntable can move in four dimensions of translation, yaw, pitch and roll of the polarizer, and can create linearly polarized light at any given angle with accuracy of ˜0.05° for the MSE system offline calibration. Experimental results of the MSE diagnostic calibration in the laboratory show that the turntable has the advantages of high positioning accuracy, flexible spatial movement and convenient control.

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