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14.46 Real-time dynamic processing analysis for the Motion Stark Effect diagnostic signal on EAST

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Motion Stark Effect (MSE) diagnostic measured the polarization direction of the Stark splitting spectrum of neutral beam to get the internal magnetic field information of Tokamak devices. According to a series of modulation technologies, the tangent value of polarization angle which MSE measured is proportional to the ratio of the second harmonic frequency modulation amplitude of photoelastic modulators (PEM). To obtain real-time amplitude and phase difference, the real-time dynamic processing analyzer based on Field-Programmable Gate Array (FPGA) was designed to acquire the signal spectrum with a high-speed windowed FFT, use frequence spectrum separation (FSS) to extract the local spectrum, do IFFT to the local spectrum to get multiple time-domain complex sequence, and calculate the amplitude and phase difference of the second harmonic frequency component at last. The system eventually outputs polarization angle information, and the information can be used for real-time feedback of other systems.

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