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12.5 Multi-channel analog lock-in system for real-time motional Stark effect measurements

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A Motional Stark Effect (MSE) diagnosis system was developed to measure the plasma current density distribution in the KSTAR tokamak. Currently, the MSE diagnostic system performs data analysis by applying Fourier transform algorithm by using the IDL (Interactive Data Language) software after measurement and digital archiving. However, in order to realize advanced plasma control aiming at the development of high performance tokamak operations, there is a demand for the MSE diagnostic system capable of real-time pitch angle measurement associated with a plasma control system (PCS). For real-time, multi-channel, and high-speed MSE data processing with high precision, an analog lock-in technique has been proposed and its feasibility has been demonstrated through the take-top tests using the photoelastic modulator. The prototype multi-channel analog lock-in system is ready for the plasma commissioning and the integration with the PCS. This work is supported by the Ministry of science and ICT in Korea.

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