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14.6 Development of the multi-channel Motional Stark Effect diagnostic on the EAST tokamak

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Measurement and control of plasma current density profile is crucial for high performance scenario development on EAST [1]. As a local magnetic measurement technique, the Motional Stark Effect (MSE) diagnostic, which employs the spectrum of injected neutral beams, is widely adopted. Recently, a multi-channel MSE diagnostic was designed and deployed on EAST. An integrated periscope, which is installed at G port, views the tangential neutral beam covering the major radius of 1.8~2.33m with a spatial resolution smaller than 3cm. A set of dual photo-elastic modulators (PEMs), which is operated at 42/47 kHz, is followed by a polarizer used to encode the polarization direction onto the modulated light intensity. The encoded light will be guided to the remote laboratory by 100m long fiber bundles. Customized dual-output filter couplers are adopted to select the desired Stark components or to measure the Doppler shifted spectra. The time-varying signals from the preamplifiers are directly recorded by a 10MHz fast data acquisition system. Meanwhile, signals at the second harmonic amplitudes from phase lock loop devices are recorded by 250kHz slow data acquisition system. The data are processed automatically after each discharge.

Primary author(s) : FU, J (Institute of Plasma Physics, Chinese Academy of Sciences)

Co-author(s) : B., Lyu (Institute of Plasma Physics, Chinese Academy of Sciences); HOLCOMB, C.T. (LLNL); KO, J. (Hefei University of Technology); WEI, Y.Q. (School of Electrical Engineering and Automation, Hefei University of Technology); LIU, D.M.; LI, Y.Y. (Institute of Plasma Physics, Chinese Academy of Sciences); LIAO, K.T. (Institute for Fusion Studies, The University of Texas at Austin); ROWAN, W.L. (Institute for Fusion Studies, The University of Texas at Austin); HUANG, H.; ZHI, Y.Q. (Institute of Plasma Physics, Chinese Academy of Sciences); YU, Q. J. (Institute of Plasma Physics, Chinese Academy of Sciences); WU, Z.W. (Institute of Plasma Physics, Chinese Academy of Sciences); WAN, B.N. (Institute of Plasma Physics, Chinese Academy of Sciences)

Presenter(s) : FU, J (Institute of Plasma Physics, Chinese Academy of Sciences); B., Lyu (Institute of Plasma Physics, Chinese Academy of Sciences); HOLCOMB, C.T. (LLNL); KO, J. (Hefei University of Technology); WEI, Y.Q. (School of Electrical Engineering and Automation, Hefei University of Technology); LIU, D.M.; LI, Y.Y. (Institute of Plasma Physics, Chinese Academy of Sciences); LIAO, K.T. (Institute for Fusion Studies, The University of Texas at Austin); ROWAN, W.L. (Institute for Fusion Studies, The University of Texas at Austin); HUANG, H.; ZHI, Y.Q. (Institute of Plasma Physics, Chinese Academy of Sciences); YU, Q. J. (Institute of Plasma Physics, Chinese Academy of Sciences); WU, Z.W. (Institute of Plasma Physics, Chinese Academy of Sciences); WAN, B.N. (Institute of Plasma Physics, Chinese Academy of Sciences)

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