

Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

MSE measurements for sawtooth and non-inductive current drive studies in KSTAR¹ J KO, Natl Fusion Res Inst, H PARK, Ulsan National Institute of Science and Technology, Y.S BEA, J CHUNG, Y.M JEON, Natl Fusion Res Inst — Two major topics where the measurement of the magnetic-field-line rotational transform profiles in toroidal plasma systems include the long-standing issue of complete versus incomplete reconnection model of the sawtooth instability and the issue with future reactor-relevant tokamak devices in which non-inductive steady state current sustainment is essential. The motional Stark effect (MSE) diagnostic based on the photoelastic-modulator (PEM) approach is one of the most reliable means to measure the internal magnetic pitch, and thus the rotational transform, or its reciprocal (q), profiles. The MSE system has been commissioned for the Korea Superconducting Tokamak Advanced Research (KSTAR) along with the development of various techniques to minimize systematic offset errors such as Faraday rotation and mis-alignment of the bandpass filters. The diagnostic has revealed the central q is well correlated with the sawtooth oscillation, maintaining its value above unity during the MHD quiescent period and that the response of the q profile to external current drive such as electron cyclotron wave injection not only involves the local change of the pitch angle gradient but also a significant shift of the magnetic topology due to the wave energy transport.

¹Work supported by the Ministry of Science, ICT and Future Planning, Korea.

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Date submitted: 15 Jul 2016

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