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A Fast MSE Measurement of MHD Magnetic Fluctuations on DIII-D,* J.D. King, M.A. Makowski, S.L. Allen, C.T. Holcomb, R. Geer, *LLNL*, R. Ellis, *LLNS*, and E.C. Morse, *UC-Berkeley* — Resolved local magnetic fluctuation measurements, along with other fluctuation diagnostics, could provide a means of accurately measuring magnetic island size and evolution. The ability to make such measurements has significant implications for the detailed analysis of the structure of NTMs and other MHD. A new 16 bit, 500 kS/s data acquisition system has been installed on all channels of the existing MSE diagnostic on DIII-D. In addition to the fundamental $2f_1$ and $2f_2$ signals used for existing MSE polarimetry measurements, the spectrum contains peaks that strongly correlate to MHD fluctuations. Of particular interest are sideband spectral peaks at $2\omega_{1,2} \pm \omega_{\text{MHD}}$, which provide information needed for recovering the amplitude of local magnetic field fluctuations. In this work, a brief quantitative validation of the underlying theory of magnetic fluctuation measurements is presented, relationships between spectral harmonics are shown, and a first attempt at a temporally and spatially resolved MHD measurement is discussed.

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