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Internal measurement of magnetic fluctuations in disrupting plasmas in DIII-D MIHIR PANDYA, B.E. CHAPMAN, UW-Madison, D.L. BROWER, J. CHEN, W.X. DING, UCLA, K.J. MCCOLLAM, J.S. SARFF, UW-Madison — We present preliminary results from a new project that aims to utilize advanced diagnostics such as Faraday-effect polarimetry for internal measurement of magnetic fluctuations during disrupting plasmas. Such a measurement can reveal dynamics not detectable by sensing coils at the plasma boundary, and we aim to better understand the physics of tearing mode onset, the thermal and current quenches, and the runaway electron plateau that sometimes follows the current quench. Our initial analysis targeted data gathered in 2018 with the Radial Interferometer Polarimeter (RIP), consisting of three horizontal chords with impact parameters relative to the equatorial midplane of -13.5, 0, and +13.5 cm. In a discharge where injection of an Ar pellet causes a disruption followed by a runaway electron plateau, RIP detects density and/or magnetic fluctuations following the current quench, but with a chordal asymmetry. The largest fluctuations are measured along the chord at -13.5 cm, which may be due to the temporary, roughly 25 cm downward shift of the plasma. This shift is tracked by external magnetics, but also by RIP, based on the fact that the equilibrium Faraday effect is zero along a chord passing through the magnetic axis. During the runaway plateau, RIP detects a steady band of low-frequency (<20 kHz) fluctuations which for the most part are not detected by the edge sensing coils. Work supported by the US DoE under DE-FC02-04ER54698 and DE-SC0019003.

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