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3D Magnetic Measurements of Kink and Locked Modes in DIII-D[1] J.D. KING, ORISE, E.J. STRAIT, General Atomics, J.M. HANSON, Columbia U., C. PAZ-SOLDAN, ORISE, N.C. LOGAN, PPPL, M.J. LANCTOT, GA, D. SHIRAKI, Columbia U. — The DIII-D magnetics diagnostic has been greatly expanded to fully characterize non-axisymmetric "3D" fields. Five poloidal locations now recover $n \leq 3$, while new HFS arrays provide poloidal spectral resolution of 7.4 cm. Initial measurements suggest externally driven kink structures deviate from MARS-F and IPEC models. These variations extend to the ideal regime, where toroidal agreement is observed. The plasma response to an $n = 3$ RMP increases monotonically as beta increases and q_{95} decreases, contrary to predictions of a screening to kink valley [1]. Finally, the temporal evolution of the 3D eigenstructure of a slowly rotating (5 Hz) quasi-static, born locked, tearing mode provides the first evidence of an appreciable $n = 2$ error field, and an estimate of the phase for future correction. This new 3D capability will be used to understand and optimize control of RWMs, NTV torque, ELMs, and error field correction to extend stable tokamak operation.

[1] M.J. Lanctot, et al., Phys. Plasmas **18**, 056121 (2011).

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Josh King
Oak Ridge Institute for Science Education

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