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Measurement and Modeling of the Plasma Response to Externally Applied Non-axisymmetric Magnetic Fields,* H. Reimerdes, M.J. Lanctot, J.M. Hanson, *Columbia U.*, A.M. Garofalo, M.S. Chu, G.L. Jackson, R.J. La Haye, M.J. Schaffer, E.J. Strait, *GA*, O. Schmitz, *FZ Jülich*, Y.Q. Liu, *UKAEA*, M. Okabayashi, W.M. Solomon, *PPPL* — Magnetic measurements in DIII-D H-mode plasmas reveal a beta dependent plasma response to externally applied low *n* magnetic fields. The plasma response must be significant since it correlates with effects on the plasma such as magnetic braking of rotation. This is confirmed by modeling using the ideal MHD plasma response model in the MARS-F code, which predicts the measured plasma response to external n=1 fields for values of beta up to ~75% of the ideal MHD beta limit calculated without a conducting wall. At higher beta non-ideal effects have to be taken into account. The increasing plasma response is responsible for the decrease of the error field tolerance with beta. The knowledge of the perturbed field inside the plasma is an important step towards a quantitative understanding of the error field tolerance and the underlying braking models.

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