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Non-axisymmetric Plasma Response to External Magnetic Perturbations,* M.S. Chu, L.L. Lao, T.E. Evans, M.J. Schaffer, E.J. Strait, *GA*, Y.Q. Liu, *Culham*, M.J. Lanctot, H. Reimerdes, *Columbia U.* — Very low frequency non-axisymmetric magnetic response in tokamaks excited by external magnetic perturbations is studied with the MARS-F code [1] using different assumptions on the plasma dynamics. In the limit of vacuum plasma response, the fields are benchmarked against the SURFMN [2] code and an analytic model. In other plasma models, the response is affected by plasma pressure, resistivity, toroidal flow, and the kinetic effects associated with the particle drifts. Depending on the coil arrangement, the plasma response could be dominated by the resonant or non-resonant components of the external field. The responses can be tested by employing different combinations of currents in appropriately designed external coils as those in DIII-D. The combined magnetic field of the axisymmetric plasma equilibrium and its non-axisymmetric responses corresponds to a perturbed 3D plasma equilibrium.

[1] Y.Q. Liu, et al., *Phys. Plasmas* **7** (2000) 3681.

[2] M.J. Schaffer, et al., *Nucl. Fusion* **48** (2008) 024004.

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