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Parametric dependence and control of 3D helical structures in MST B.E. CHAPMAN, D.J. DEN HARTOG, J.A. GOETZ, M.B. MCGARRY, E. PARKE, J.A. REUSCH, J.S. SARFF, UW-Madison, W.F. BERGERSON, D.L. BROWER, W.X. DING, L. LIN, UCLA, F. AURIEMMA, S. CAPPELLO, P. FRANZ, P. INNOCENTE, R. LORENZINI, E. MARTINES, B. MOMO, P. PIOVESAN, M. PUIATTI, M. SPOLAORE, D. TERRANOVA, P. ZANCA, Consorzio RFX — MST plasmas with a central 3D helical structure are now routinely achievable. As in RFX-mod, the stellarator-like structure arises in otherwise toroidally axisymmetric plasmas when the innermost-resonant m = 1 tearing mode grows to large amplitude and dominates the core-resonant-mode spectrum. The tearing mode spectrum in MST varies strongly with toroidal plasma current. Peaked spectra with a helical structure occur most reliably at high Ip (0.6 MA), while at low Ip (0.2 MA), the spectra are quite flat. This trend is like that in RFX-mod and may reflect a dependence on the Lundquist number. Preliminary MST data also show that manipulation of the inductive electric field has a significant impact, driving the dominant mode to large amplitude more robustly, and reducing the other modes. At high Ip, Te(0) $>$ 1 keV with a possible several-fold increase in the energy confinement time. Supported by USDOE.

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