Abstract Submitted
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Impact of helical boundary conditions in MHD modeling of RFP and tokamak plasmas D. BONFIGLIO, S. CAPPELLO, D.F. ESCANDE, P. PIOVESAN, M. VERANDA, Consorzio RFX, L. CHACÓN, ORNL — Helical boundary conditions imposed by the active control system of the RFX-mod device provide a handle to govern the plasma dynamics in both RFP and Ohmic tokamak discharges [1]. By applying an edge radial magnetic field with proper helicity, it is possible to increase the persistence of the spontaneous helical RFP states at high current,and to stimulate them also at low current or high density. Helical BCs even allow to access helical states with different helicity than the spontaneous one [2]. In Ohmic tokamak operation at $q(a) < 2$, the presence of the 2/1 RWM reduces the sawtoothing activity of the 1/1 internal kink, which takes a stationary snake-like character instead. Many of these features are qualitatively reproduced in 3D nonlinear MHD modeling. We study the impact of helical BCs on the MHD dynamics in both RFP and tokamak with two successfully benchmarked numerical tools, SpeCyl and PIXIE3D [3]. We recover the bifurcation from a sawtooth to a snake solution when imposing a 2/1 BC in the tokamak case and we interpret this as a toroidal/nonlinear coupling effect. We show that the bifurcation is more easily stimulated with a 1/1 BC.

[1] P. Piovesan, invited talk this meeting
[2] M. Veranda et al EPS-ICPP Conference (2012) P4.004
[3] D. Bonfiglio et al Phys. Plasmas (2010)

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