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Optimization of helical equilibria control in RFX-mod LIDIA PIRON, DAVIDE FABRIS, LIONELLO MARRELLI, PAOLO PIOVESAN, ANTON SOPPELSA, PAOLO ZANCA, Consorzio RFX — Recent experiments in RFX-mod have demonstrated that m=1,n=7 helical equilibria can be sustained by imposing helical boundary conditions by means of magnetic feedback [1]. The optimization of these equilibria consists on the one hand in the identification of the optimal feedback parameters in the mode controller and the amplitude and phase of applied helical magnetic fields; on the other hand in the characterization of the wall dynamic response to external magnetic fields, produced by active coils. The 1,7 mode dynamics has been initially investigated with the RFXlocking code, adopting an optimization approach similar to the one described in [2]. Moreover, dry shots have revealed that, when doing magnetic feedback, magnetic field errors are produced by 3D wall structures. A dynamic decoupler algorithm, which accounts for the mutual couplings between active coils and magnetic sensors, has been implemented and tested in real time. Experimental results show that error fields can be strongly suppressed thanks to this tool.

[1] P. Piovesan *et al*, 2011 Plasma Phys. Control. Fusion **53** 084005
[2] L. Piron *et al*, 2010 Nucl. Fusion **50** 115011

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