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Helical states with ordered magnetic topology in the Reversed Field Pinch D. BONFIGLIO, S. CAPPELLO, M. GOBBIN, G. SPIZZO, Consorzio RFX, Euratom-Enea Association, Padova, Italy — The reversed field pinch (RFP) configuration for magnetic confinement has shown to develop helical configurations characterized by good magnetic surfaces both in experiments and visco-resistive 3D MHD numerical computations [1]. In the RFX-mod experiment, quasi-single helicity (QSH) states with ordered magnetic topology have been found to develop both spontaneously during high current discharges [2] and in a stimulated way through the periodic oscillation of the toroidal flux (so-called OPCD technique) [3]. In both cases, the expulsion of the separatrix of the dominant mode has proved to be the key for significant chaos healing [4], as expected by theory [5]. In this work, we present results of visco-resistive 3D MHD numerical modeling aiming at clarifying the mechanism and the conditions for separatrix expulsion and chaos healing in spontaneous and stimulated cases. The effect is investigated by reconstruction of the magnetic topology through field line tracing algorithms and by study of test particle dynamics. [1] S. Cappello, Plasma Phys. Control. Fusion **46,** B313 (2004) & references therein. [2] M. Valisa et al., invited oral, EPS Conf. on Plasma Physics (2008). [3] D. Terranova et al., Phys. Rev. Lett. **99,** 095001 (2007). [4] R. Lorenzini et al., Phys. Rev. Lett. **101,** 025005 (2008). [5] D. F. Escande, R. Paccagnella et al., Phys. Rev. Lett. **85,** 3169 (2000).

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