

Abstract Submitted
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Benchmark of Orbit and NEMATO codes on magnetic topology reconstruction in RFPs G. CIACCIO, University of Padova, M. VERANDA, D. BONFIGLIO, S. CAPPELLO, G. SPIZZO, Consorzio RFX, Padova, Italy, L. CHACÓN, ORNL, R.B. WHITE, PPPL, P.O. Box 451, Princeton, NJ 08543 — ORBIT is a Hamiltonian guiding center code which describes test-particle motion in an electromagnetic field.¹ In the limit $\rho_{\parallel} \rightarrow 0$, $\rho_{\parallel} = v_{\parallel}/B$ it can be used to trace the magnetic field topology, in a way in all respects similar to symplectic codes. NEMATO² is a field-line tracing code, implemented to integrate solenoidal flows for incompressible fluid dynamics, with automatic volume preservation. In a practical application, the two codes have been used to study the structure of the $q = 0$ island chain which characterizes the RFP edge and its behavior as a function of the reversal parameter $F = B_{\phi}(a)/\langle B_{\phi} \rangle$. As input for both codes we used the snapshot of a 3D nonlinear MHD visco-resistive simulation (SpeCyl code). The first benchmarking test employs a Hamiltonian (single-mode) magnetic field configuration. Both codes successfully yield field lines which follow flux surfaces in both the $m = 1$ and $m = 0$ cases. The comparison between the codes has been successfully extended to a chaotic magnetic field configuration, including many modes.

¹R. B. White and M. S. Chance, Phys. Fluids B **27** (1984) 2455

²J. M. Finn, L. Chacón, Phys. of Plasma **12** (2005) 054503

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