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Single helicity and quasi-single helicity states in RFPs GIAN LUCA DELZANNO, LUIS CHACON, JOHN M. FINN, LANL — We present a systematic study of single helicity (SH) states and quasi-single helicity (QSH) states in RFPs. We begin with cylindrical paramagnetic pinch equilibria with uniform resistivity, characterized by a single dimensionless parameter proportional to the toroidal electric field, or the RFP toroidal current parameter Θ . For sufficiently high Θ , there are several unstable $m = 1$ ideal MHD instabilities, typically one of which is non-resonant, with $1/n$ just above $q(r = 0)$. We evolve these modes nonlinearly to saturation for low Hartmann number H . We then obtain the $m = k = 0$ quasilinear profiles, which typically have toroidal field reversal, and study their stability. For typical cases, these profiles may remain unstable to tearing modes, but only for sufficiently high H . For lower H these states are stable. We show results indicating the proximity of these thresholds to the thresholds between SH and QSH behavior.

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