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Fast growing instabilities and non-linear saturated states in hybrid tokamak and RFP plasmas DANIELE BRUNETTI, JONATHAN GRAVES, WILFRED COOPER, EPFL-CRPP, DAVID TERRANOVA, Consorzio RFX euratom ENEA, CHRISTER WAHLBERG, Department of Astronomy and Space Physics, EURATOM/VR Fusion Association — The stability of large scale m=1 helical displacements of tokamak and RFP plasmas with reversed shear are investigated using the 3D equilibrium code VMEC/ANIMEC and the non-linear initial value stability code XTOR. The non-linear amplitude of such saturated modes obtained with XTOR is compared both with the helical core structure resulting from VMEC/ANIMEC calculations, and with analytic predictions. For conditions where the magnetic shear is allowed to become small over a large portion of the plasma, resistive sidebands coupled to a core kink-like mode exhibit extremely fast growth. The sensitivity of the dependence of the growth rate upon the Lundquist number to two-fluid effects has been examined analytically and also numerically with the XTOR code. It is found that these additional non-MHD effects tend to moderately reduce the growth rate of resistive modes. A family of modes are obtained, including modes with novel scaling on Lundquist number, some of which rotate in the electron diamagnetic direction, and others in the ion diamagnetic direction. In ideal and resistive numerical simulations, qualitative agreement has been found between XTOR and analytical predictions in absence of non-MHD effec

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