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Nonlinear dynamics and saturation of magnetic islands A. POYE, International Institute for Fusion Science, Aix Marseille Université, CNRS, IIFS-PIIM, UMR7345, Marseille 13397, France, A. SMOLYAKOV, University of Saskatchewan, Saskatoon, Canada, O. AGULLO, S. BENKADDA, International Institute for Fusion Science, Aix Marseille Université, CNRS, IIFS-PIIM, UMR7345, Marseille 13397, France, X. GARBET, CEA, IRFM, F-13108 Saint Paul Lez Durance, France — Saturation of magnetic islands is investigated numerically and analytically. The asymptotic matching theory is extended to include higher order and asymmetry effects. Role of $m=0$ nonlinear harmonic is investigated. In regimes of large values of the tearing mode stability parameter Δ' island dynamics is investigated numerically. In these regimes, the island dynamics exhibit a number of transient features such as coalescence instability, X-point collapse and plasmoid generation. It is shown that conditions (and characteristics) for these transient instabilities depend on the viscosity and resistivity however the final width of the saturated island is independent of the viscosity and resistivity values.

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