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Nonlinear dynamics of the tearing mode for any current gradient DOMINIQUE ESCANDE, UMR 6633 CNRS-Université de Provence, NICOLAS ARCIS, DRFC/EURATOM-CEA, MAURIZIO OTTAVIANI, DRFC/EURATOM-CEA — Within the traditional frame of reduced MHD, a new systematic perturbation expansion provides the equation ruling the nonlinear growth and saturation of the tearing mode for any current gradient. The small parameter is the magnetic island width w. The evolution equation depends on w through a term $w \ln(w_0/w)$ where w_0 is a nonlinear scale length which was absent in previous works. The technique is applicable to the case of an external forcing. The solution for a static forcing is computed explicitly and it exhibits three regimes in the dynamics. A simpler version of Thyagaraja's technique yields an independent confirmation of the unforced case.

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