

Nonlinear tearing mode study using the “almost ideal magnetohydrodynamics (MHD)” constraint

C. Ren,^a T.H. Jensen,^b and J.D. Callen^a

^a*University of Wisconsin-Madison, Madison, WI 53706-1687*

^b*General Atomics, P.O. Box 85608, San Diego, CA 92186-9784*

(February 5, 1998)

Abstract

Tearing modes of finite amplitude are studied numerically using the “almost ideal magnetohydrodynamics (MHD)” constraint, which is a modification of the ideal MHD constraints that allows reconnection of the magnetic field lines. For the one dimensional initial equilibria studied here, the stability criterion is found to be the same as that of the linear tearing mode theory, namely $\Delta' < 0$. The nonlinear saturation level of the mode can also be determined; it is found to be smaller than that estimated from $\Delta'(W_{sat}) = 0$ [B. Carreras, B.V. Waddell and H.R. Hicks, Nucl. Fusion **19**, 1423 (1979)].

52.35.Py, 52.30.Jb, 52.30.Bt