Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Relaxed MHD model for island formation by forced reconnection in a rippled-boundary plasma slab ROBERT DEWAR, Australian Nat. U., ZENSHO YOSHIDA, SHINGO EMOTO, U. Tokyo, AMITAVA BHATTACHARJEE, PPPL — Ideal MHD motions are strongly constrained by an infinite number of microscopic constraints or *Casimir invariants*. To generalize Taylor relaxation theory [1] we retain a subset of these constraints on isolated surfaces (current sheets or *singular Casimirs* [2]) that prevent total relaxation. We call this approach *Relaxed MHD* (RXMHD), and when the current sheet surfaces partition the plasma into disjoint regions we call this *MultiRegion Relaxed MHD* (MRXMHD). E.g. in the SPEC 3-D equilibrium code [3] these current sheets are taken to be tori. Another application is to the shielding current sheets formed in resonant forced reconnection, which are most simply examined in the Hahm–Kulsrud–Taylor [4] model. Recently [5] a sequence of analytic "plasmoid" equilibria continuously connecting the two solutions found in [4] have been found. By imposing conservation of toroidal flux and helicity on these new solutions we construct a sequence of intermediate states arising as gaps open up in the initially continuous shielding current sheet on the y-axis and an island forms. [1] J. B. Taylor *Rev. Mod. Phys.* **58** 741 (1986) [2] Z. Yoshida & R. L. Dewar *J. Phys. A: Math. Gen.* **45** 365502 (2012) [3] S. R. Hudson, R. L. Dewar, G. Dennis, M. J. Hole, M. McGann, G. von Nessi, & S. Lazerson *Phys. Plasmas* **19** 112502 (2012) [4] T. S. Hahm & R. M. Kulsrud *Phys. Fluids* **28** 2412 (1985) [5] R. L. Dewar, A. Bhattacharjee, R. M. Kulsrud & A. M. Wright, arxiv:1304.6273 (accepted Phys. Plasmas 2013)

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Date submitted: 13 Jul 2013 Electronic form version 1.4