IAEA FEC 2016 (Kyoto)

Extension of numerical matching method to weakly nonlinear regime — beyond the Rutherford theory of magnetic island evolution

M. Furukawa¹⁾ and S. Tokuda²⁾

1) Tottori Univ. 2) Res. Org. Information Sci. Tech.

Schematic explanation

outer *****inner *****

Newcomb eq.

axis

Matching the solutions using

appropriate boundary conditions

rational, surface

Nonlinear eq. incl. resistivity

outer

edge

TH/P1-14

- We have extended the numerical matching method using a finite-width inner region, developed for linear stability analysis of resistive MHD, to weakly nonlinear cases
- Our new method
 - applies both linear and nonlinear phases continuously
 - well approximates the fully-nonlinear simulation, with shorter computational time



0.12 magnetic island width $w_{2/1}$ 0.1 0.08 0.06 num. match., $\Delta r=0.2$ 0.04 num. match., $\Delta r=0.4$ full 0.02 full (m/n=0/0 suppressed) Rutherford eq. 0 0.5 1.5 0 $t / 10^4$