

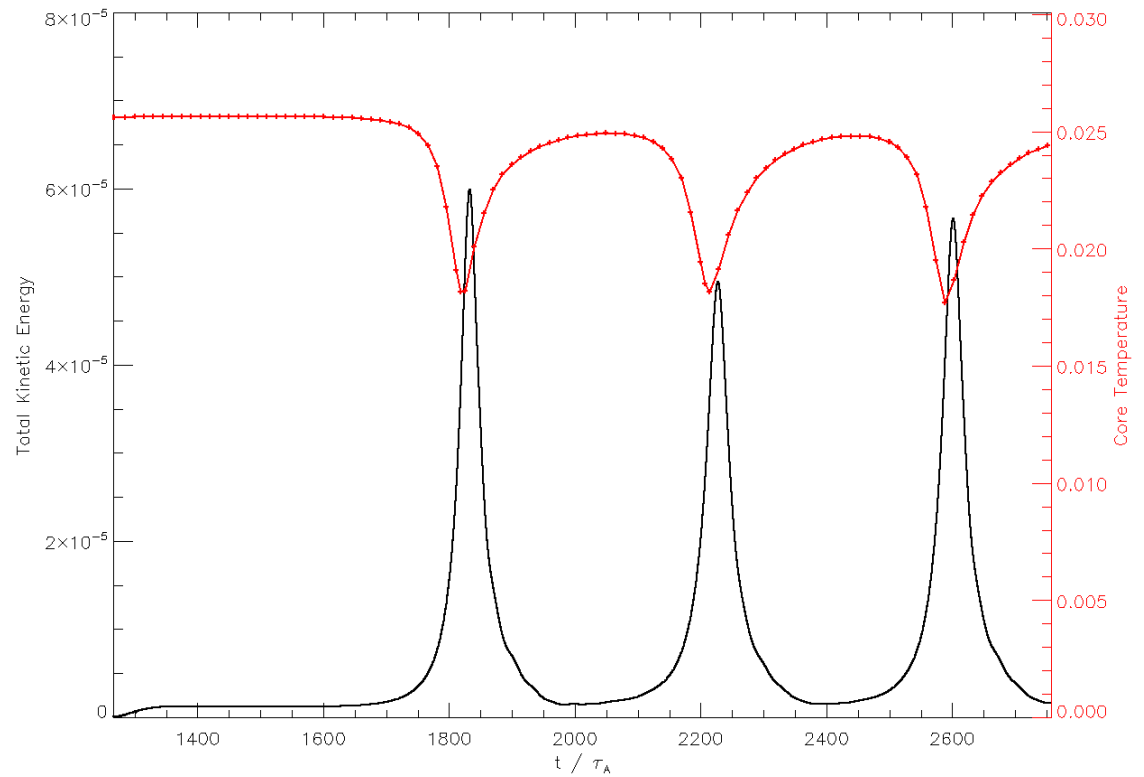
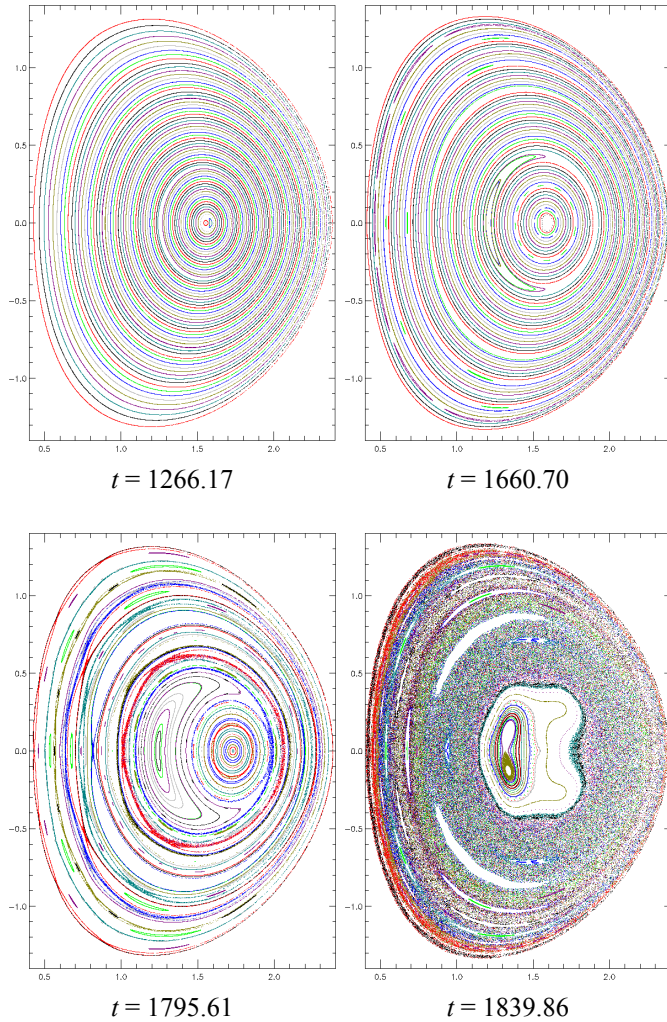
# M3D Modeling of NSTX

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NSTX 5 Year Plan Meeting – MHD  
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# M3D Modeling of NSTX

## Sawtooth

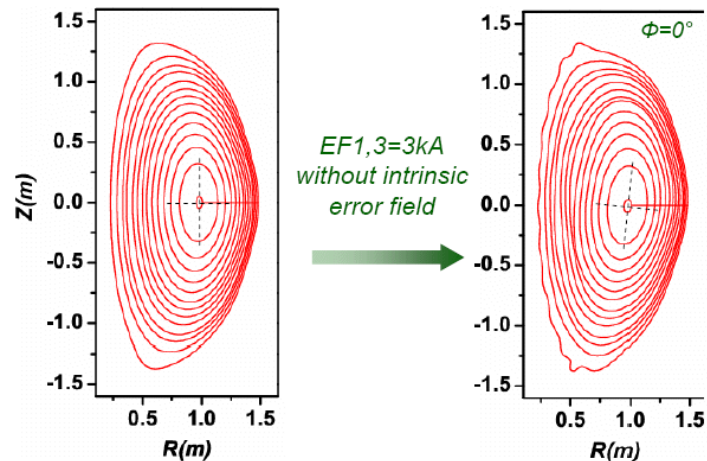


Correlate with SXR camera diagnostic?

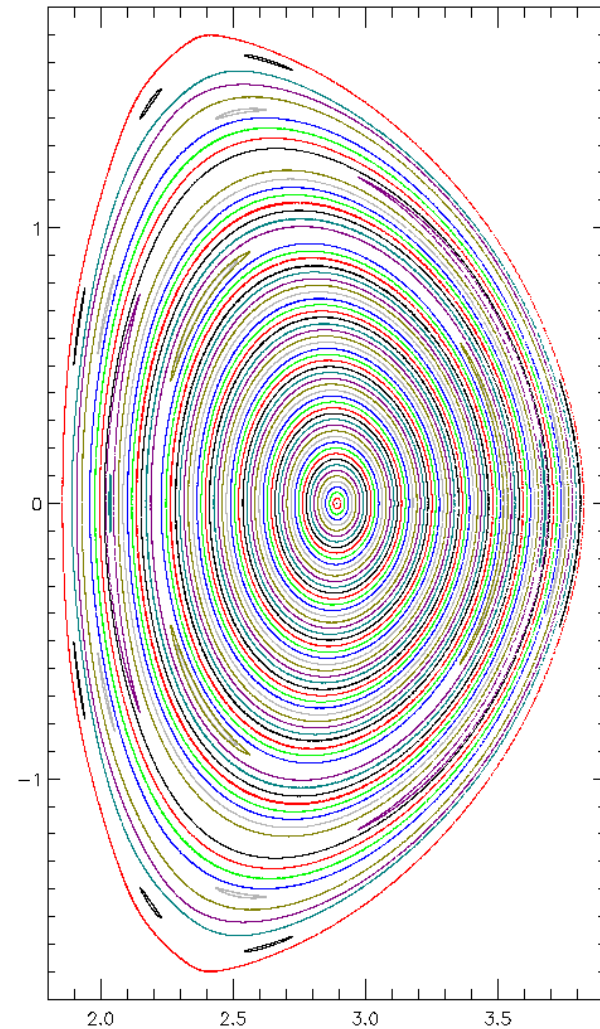
# M3D Modeling of NSTX

## Error Fields

- Extension of linear ideal studies carried out by J. Park:



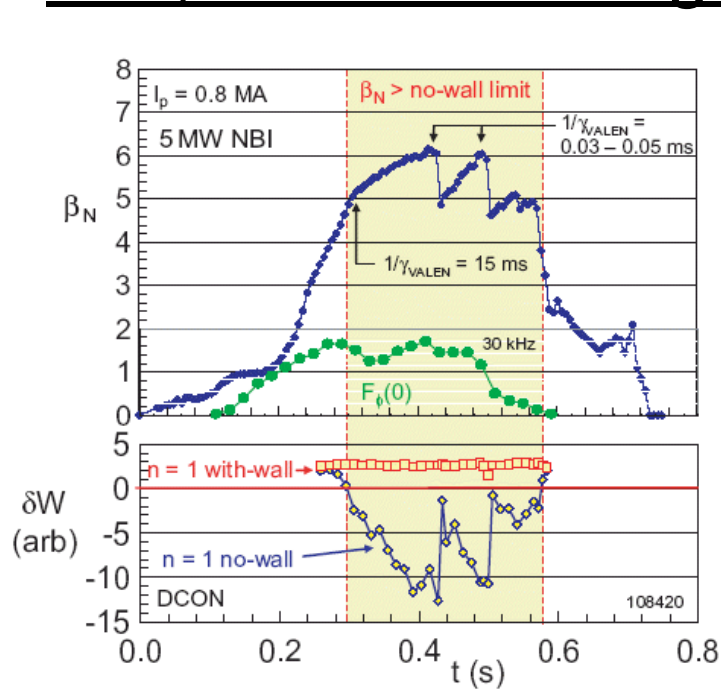
- Can compute nonlinear, non-ideal response to given perturbations.



DIII-D equilibrium with  
2,1 perturbation in  $\psi$  on boundary

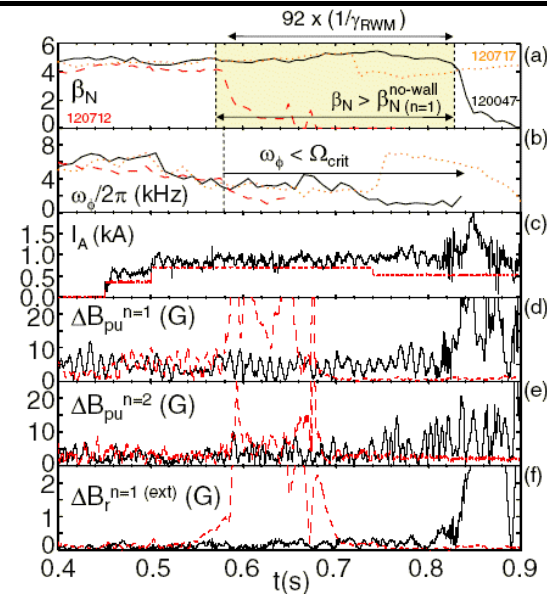
# M3D Modeling of NSTX

## $n=1,2$ modes during active RWM stabilization



**Figure 11.** Evolution of  $\beta_N$ ,  $F_\phi$ , and ideal no-wall and with-wall stability criteria for a plasma exceeding  $\beta_N/\beta_{N, no-wall} = 1.3$  and approaching  $\beta_{N, wall}$ .

**Sabbagh, et al., 2004.**



**FIG. 1** (color online). RWM active feedback stabilization in low-rotation plasmas. Solid curves, actively stabilized plasma at  $\omega_\phi$  significantly below  $\Omega_{crit}$ ; dashed curves, RWM unstable plasma at  $\omega_\phi/\Omega_{crit} = 1$  with active feedback turned off; dotted curves, (upper two frames) actively stabilized plasma suffering a beta collapse from an internal  $n = 2$  plasma mode. Shown are the evolution of (a)  $\beta_N$ , (b)  $\omega_\phi$  near  $q = 2$ , (c) current in representative nonaxisymmetric control coil, (d),(e) mode amplitude of  $n = 1$  and 2 field components measured by the upper  $B_p$  sensor array, and (f) mode amplitude of  $n = 1$  field component at the midplane, external to the vacuum vessel.

**Sabbagh, et al., 2006.**

Requires improvement in accuracy of resistive wall version of M3D.