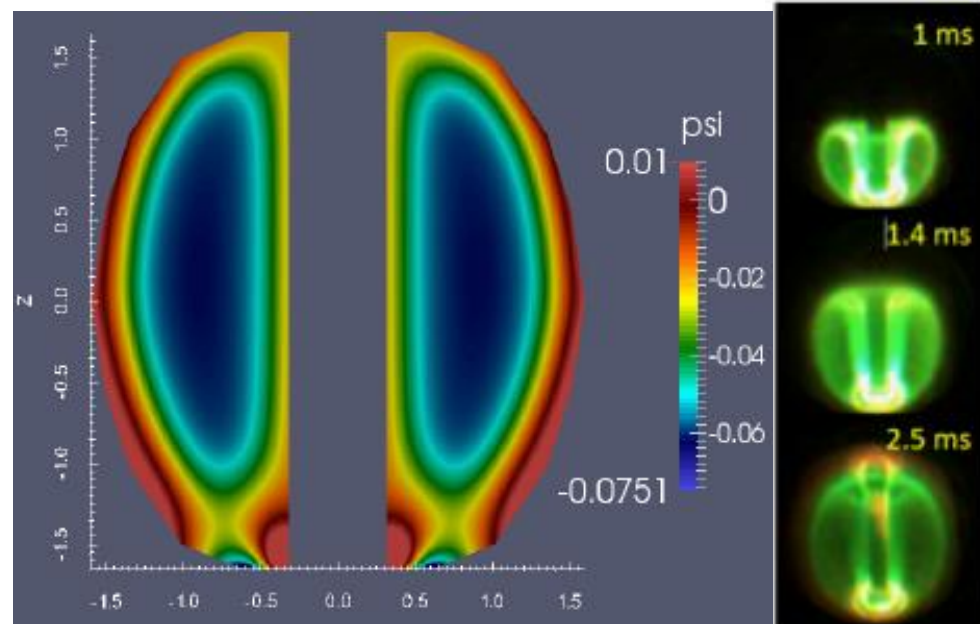


Physics of Flux Closure during Plasmoid-mediated Reconnection in Coaxial Helicity Injection – TH/P1-2 TH-S

Transient CHI is used as a *solenoid-free* plasma start-up method in NSTX and NSTX-U & can be used to simplify the Tokamak

- Two mechanism for flux closure seen in Resistive MHD simulations
- Sweet-Parker type reconnection (electromagnetic forces cause oppositely directed field lines to come closer in injector region and reconnect)
- New Plasmoid mediated reconnection also observed (the S-P current channel becomes unstable at high Lundquist number and breaks up into plasmoids that merge)
- High flux closure observed during the presence of both mechanisms



Poloidal flux in simulations and fast camera images during NSTX experiments

Transient CHI is applicable to STs and Tokamaks that use superconducting poloidal field coils

- High flux closure (>70%) observed in simulations in which the coil currents are held constant in time