

Physics of fast flux closure in coaxial helicity injection experiments in NSTX

Motivations

- Simulations to provide understanding of the physics of injection, flux-surface closure, and current drive for CHI plasmas
- to extend these results to NSTX-U; insight for steady-state opr

Outline

- Transient CHI **experiments**
- The model – simulations at constant flux
- Simulations at temperatures and plasma currents similar to those in the experiment
- Physics of magnetic reconnection and flux closure
- Simulations at finite pressure

Summary

- Through direct numerical calculations of the radial forces, we found that as the injector voltage is turned off, a radial bi-directional pinch flow causes the field lines to reconnect.
- Closed flux surfaces during transient CHI can be explained through 2-D Sweet-Parker type reconnection.

The simulation draws upon the first-ever occurrence of a **forced** magnetic reconnection during an experiment on a large-scale fusion facility.