CHI Summary

- Transient CHI (XP606)
  - All systems operated reliably without any faults

- Edge Current drive (XP533)

Transient CHI (March 2006)

Transient CHI experiment were run in the configuration (15mF, 1.5kV) used during 2005 to produce plasma currents that show current persistence after the injector current is reduced to zero.

60kA of closed flux current was produced, and the discharge was diagnosed with the Thomson scattering diagnostic, fast visible camera, soft x-ray, bolometer array and spectroscopy systems. A toroidal field scan was conducted.

Results are consistent with observations from the NSTX 2005 run and with results from the HIT-II experiments at the University of Washington, and indicate that higher capacitor bank voltage and good vessel conditions are important requirements for increasing the magnitude of the closed flux current.

On many discharges low power HHFW (50 to 150kW) was applied to study antenna loading and coupling of these waves to the CHI target.

Transient CHI (May 2006)

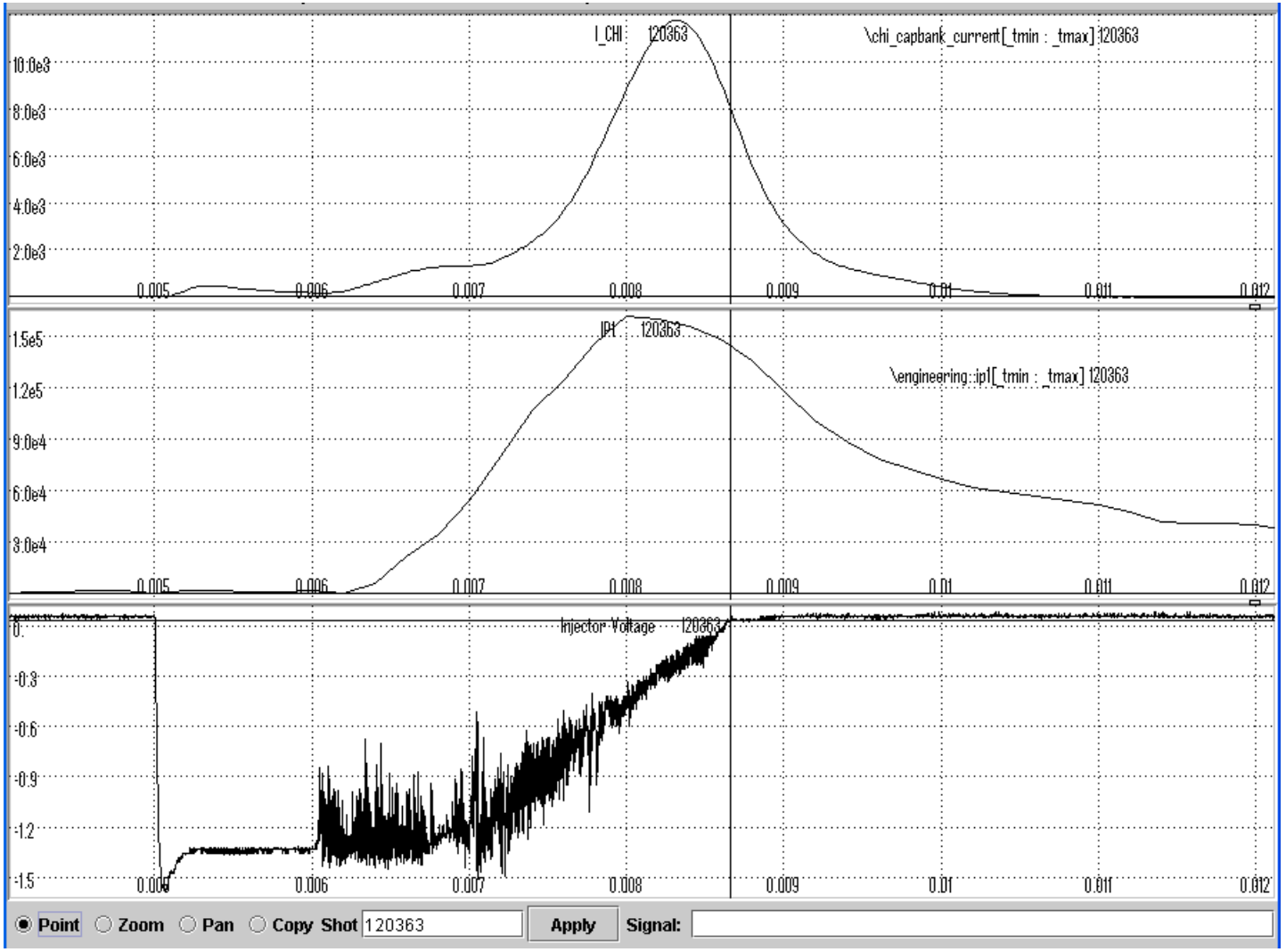
This run utilized a new capacitor based snubber and new noise suppression MOVs (Metal Oxide Varistors) to allow operation above the 1.5kV used in previous experiment.

These systems worked very well and limited the injector voltage to about 1.75kV. On NSTX, the applied CHI voltage was increased above 1.5kV for the first time.

Using a 15mF capacitor bank the magnitude of the initial peak current was increased up to 180kA and at least 70kA of closed flux current was generated.

On a few discharges modest power HHFW (about 1MW) was applied to study antenna loading and coupling of these waves to the CHI target

Discharges with currents of 60kA or more routinely produced



Improvements to the closed flux current magnitude requires these improvements

- Improve time response of current monitor
  - Possible installation of current monitor from HIT-II
- Capacitor bank size needs to be varied
  - To compensate for voltage droop due to new snubber
  - Requires 3-4 controlled accesses
- Wall pumping not yet utilized
  - March run showed the importance of residual neutrals in vessel
  - Will use He plasma discharges
  - Use of Li was the original plan (similar to Ti-gettering on HIT-II)
- New stable discharges with higher injector current now produced (May run)
  - Increased plenum size
  - Requires more capacitors to utilize this scenario
  - Physics of Lo and Hi injector current modes important for scaling studies

Edge Current Drive

- Developed target two target shapes
  - single NBI source for MSE
- Noise on flux loops (and Ip Rogowski)
  - Loss of control of plasma position (moves out)
  - Possible work around is to clamp all coil currents during CHI
- Observed up to 30 kA of Ip
  - Plasma motion makes determination of persistence impossible
  - MSE data may provide some information

Run time requirements

- NSTX only ST utilizing CHI
  - Results from HIT-II now reproduced on NSTX
  - NSTX injector geometry requires additional system optimization (simple geometry in HIT-II)
- Transient CHI used about 2 days
  - 1 day of run time left in base plan
  - Planned experiments, which require controlled access, He discharges and optimization requires a minimum of two run days
  - Some time to be used for tests with and without HHFW