NSTX Team Meeting - Physics Analysis

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Transport Studies

- GTC-Neo Code/ W. Wang
  - detailed particle orbits have been included in this global δf particle-in-cell gyro-kinetic code
  - can now be used to calculate neoclassical transport, bootstrap currents and E_{radial} in NSTX plasmas.
  - Comparisons against more approximate models (e.g., NCLASS, etc) will be made.
  - Initial studies reported this morning by W. Wang at PPPPL Theory Seminar
- Error analysis technique for thermal conductivities / B. LeBlanc
  - A method to determine the error bars on thermal conductivities for a given NSTX discharge from a single TRANSP run is being developed.
  - The method uses TRANSP to determine the volume-integrated conducted power and a detailed stand-alone data analysis tool to determine the error bars on the density and plasma temperatures and their gradients.
  - Some final improvements related to the treatment of the density and temperature gradients are currently being implemented.

HHFW Heating and CD Modeling

- TRANSP & CURRAY Package / (K. Indireshkumar, T.K. Mau and B. LeBlanc):
  - integrated package is now available in the TRANSP “pshare” area
  - HHFW power deposition profiles look reasonable at all time steps in a TRANSP analysis of an NSTX HHFW discharge
  - HHFW CD profiles are currently being integrated into the poloidal field diffusion solver in TRANSP

- AORSA-2D code (E.F. Jaeger / ORNL , C.K. Phillips, R. Dumont / CEA and J. Spaleta / P.U.)
  - Code has been generalized to include fully non-Maxwellian species in the wave field calculations
  - Capability to run the code from PPPL is being implemented (requires rebuilding the PLPLOT graphics package on the PPPL cluster)
  - Work currently supported by RF SciDAC project

Equilibrium Studies

- FLOW code - L. Guazzotto, J. Manickam, S. Kaye
  - Code now runs reliably with equilibrium profiles imported from TRANSP
  - Analysis of NSTX discharges is now underway
  - Simulations of profile asymmetries in the density and temperature will be compared against experimental data

NSTX Equilibrium Reconstruction Upgrades

- NSTX EFIT and PHOENIX upgrades (S. Sabbagh):
  - Improvements include:
    - toroidal rotation, flux iso-surface, and pitch angle constraints
      - using CHERS Ti, dynamic pressure, Thomson iso-Te surfaces
        - » rotation and iso-Te surfaces yield a self-consistent solution
        - » use of iso-Te surfaces should reduce q profile error
        - » CHERS Ti reduces error bar on pressure profile input
      - pitch angle input in preparation for MSE data
        - » Pitch angle computations presently read from EFIT01, or 02
    - Optionally include TRANSP pressure profile
    - Double the # of measured constraints relative to existing analysis
    - PHOENIX upgraded to provide this analysis between-shots
  - Status:
    - New NSTX EFIT executable built
    - PHOENIX upgrades now writing input data files – initial runs to occur this week