

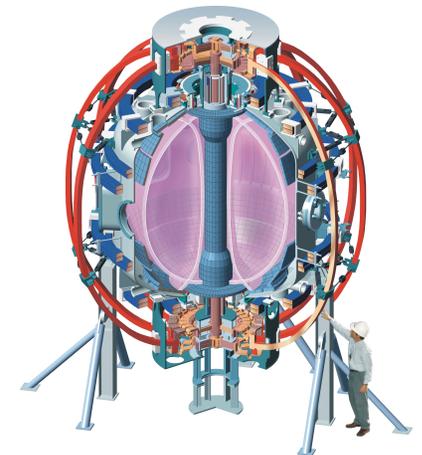
# Code Upgrades for Analysis of EBW and HHFW



NSTX Research Forum 2003

M. D. Carter, E. F. Jaeger,  
D. B. Batchelor, D.A. Rasmussen

**Oak Ridge National Laboratory**



# Code upgrades would expand the capability for analyzing EBW and HHFW coupling and edge effects



- Existing EBW plan
  - Study launch EBW designs between 1<sup>st</sup> and 2<sup>nd</sup> harmonic (10-15 GHz) using GLOSI/OPTIPOL codes
  - Modify OPTIPOL for realistic antenna patterns
  - Study core power deposition and CD with AORSA2D
- Expanded EBW & HHFW plan
  - Extend edge models to arbitrary frequency by upgrading AORSA1D and merging with existing codes in order to
    - Calculate direct excitation of IBW in HHFW
    - Estimate parametric decay for HHFW
    - Study EBW launch and temperature/collision effects at arbitrary frequency (> 2nd harmonic) by combining OPTIPOL
  - Include existing plan above

# The upgrades required for AORSA1D have been identified



- Need transition to vacuum at the edge
- Need static poloidal magnetic field but no  $B_x$
- Need absorber to simulate outgoing boundary conditions
- Need automatic checking for convergence
- Need to specify tangential RF  $\underline{B}$  at the edge for the source term instead of  $\underline{J}_{\text{ant}}$ 
  - Need to factor matrix once, then solve twice for each RF polarization ( $B_y$  and  $B_z$ )
  - Need to collect  $E_y$  and  $E_z$  on surface for each of  $B_y$  and  $B_z$  sources to generate impedance for each tangential Fourier mode
- Coarse parallelization at source mode level