

## **Predicting HHFW Heating Efficiency on NSTX via Whole-Device Full-Wave Simulation\***

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We present a qualitative comparison of NSTX HHFW heating efficiency observations[1,2] with results from the AORSA[3] whole-device, 3-D linear simulation. The simulation retains a realistic geometry and core plasma kinetic physics such that scrape-off plasma linear RF fields can be calculated. By examining H-mode, L-mode and neutral beam heated scenarios we quantify the conditions that result in a fast-wave standing mode in the scrape-off plasma. These large amplitude coaxial modes are expected to damp on collisions or couple to non-linear damping mechanisms and be directly related to an observed drop in core heating efficiency. Results are also presented for possible NSTX upgrade (NSTX-U) scenarios with discussion focused on the upgrades impact on scrape-off plasma mode formation. Furthermore, the whole-device simulation predicts the presence of whispering gallery type traveling modes localized just inside the core plasma, confined by the density pedestal on the low-field side and fast-wave cut-off on the high-field side. The impact of these edge localized modes on ion heating will be discussed.

[1] G. Taylor et al., Phys. of Plasmas **17**, 056114 (2010).

[2] J. Hosea et al., Phys. of Plasmas **15**, 056104 (2008).

[3] E.F. Jaeger et al, Phys. Rev. Lett. **90**, 195001 (2003).

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