Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

First Order Corrections to the Plasma Conductivity Tensor for Wave Heating Simulations with AORSA[1] E.F. JAEGER, XCEL Engineering Inc., L.A. BERRY, D.L. GREEN, Oak Ridge National Laboratory, D.N. SMITHE, Tech-X Corporation, RF SCIDAC TEAM — Spectral wave solvers such as AORSA [1] have been used extensively to model electromagnetic wave heating in two dimensional (2D) tokamak plasmas. Spectral methods allow wave solutions to all orders in the ratio of ion Larmor radius to wavelength (ρ/λ). However 2D simulations with AORSA have so far assumed a plasma conductivity that is zero order in the ratio of ion Larmor radius to equilibrium scale length (ρ/L). Here we extend these calculations to include first-order corrections proportional to gradients in equilibrium quantities such as density, temperature and magnetic field [2]. These are equivalent to odd-order derivative terms used in finite difference schemes and are necessary for conservation of energy when mode-converted electrostatic waves propagate in regions of strong gradients.

[1] E.F. Jaeger, L.A. Berry, E.F. D'Azevedo, *et al.*, Phys. Plasmas **8**, 1573 (2001).
[2] D. N. Smithe, Plasma Phys. Controlled Fusion **31**, 1105 (1989).

[1]This research used resources of the National Center for Computational Sciences at Oak Ridge National Laboratory, which is supported by the Office of Science of the U.S. Department of Energy under Contract No. DE-AC05-00OR22725.

E. F. Jaeger
XCEL Engineering Inc.

Date submitted: 14 Jul 2010 Electronic form version 1.4