

# **Integrated modeling of wave-plasma interactions in fusion systems**

D. B. Batchelor

*Oak Ridge National Laboratories*

There is great potential for electromagnetic wave techniques to provide control of fusion plasmas by means of localized heating, current drive, flow drive and energetic particle production. With support from the Scientific Discovery Through Advanced Computation (SciDAC) program, we have established a multi-institutional partnership between plasma physicists and computational scientists, the overarching goal being to obtain quantitatively accurate predictive understanding of electromagnetic wave processes important for heating, current drive, stability and transport applications in fusion-relevant plasmas. Activities during the first two years of the project have focused on massive parallelization and acceleration of computer-intensive full-wave RF field solver codes, extension of all-orders methods to two- and three-dimensional plasmas, increasing the physics detail contained in the RF conductivity operator, inclusion of non-Maxwellian distributions, linking to Fokker-Planck solvers, benchmarking and code comparison, and application to wave propagation problems in Alcator C-Mod, NSTX and LHD.