Partial FFT Direct Parallel Algorithms for Subsurface Scattering Problems

Ron Gonzales

PhD Candidate
Department of Mathematics and Statistics
Idaho State University

Abstract:

The present research introduces a direct parallel partial fast Fourier transform (FFT) algorithm for the numerical solutions of the two- and three-dimensional Helmholtz equations. The governing equations are discretized by high-order compact finite difference methods. The resulting discretized system is indefinite, making the convergence of most iterative methods deteriorate as frequency increases. For indefinite systems parallel direct approaches are a better alternative, especially for systems with discontinuous and singular right-hand sides. The research focuses on the efficient parallel implementation of the proposed algorithm in both shared (OpenMP) and distributed (MPI) memory environments. The complexity and speed-up of the direct parallel methods are investigated on scattering problems with realistic ranges of parameters in air, soil and mine-like targets.

Faculty & students are welcome!

Thursday, April 21, 2022

9:00 am   **PS 317**

Zoom Meeting ID: 820 590 93232