Boulder Fluid Dynamics Seminar Series

Tuesday, August 19, 2014
3:30pm-4:30pm (refreshments at 3:15pm)
Bechtel Collaboratory in the Discovery Learning Center (DLC)
University of Colorado at Boulder

Modeling with radial basis function-generated finite differences: Applications to Mesoscale Nonhydrostatic Atmospheric Modeling

Natasha Flyer, *National Center for Atmospheric Research*

In applications of radial basis functions (RBFs) for fluid modeling, infinitely smooth RBFs have traditionally been used due to their spectral convergence properties. However, fluid flows in nature can exhibit complex features such that spectral accuracy cannot be realized on resolutions that are observable or practical. A novel approach for modeling with RBF-generated finite differences (RBF-FD) is presented by using polyharmonic spline RBFs together with high-order polynomials. The approach is tested on nonhydrostatic compressible atmospheric flows in limited area domains.

RBF-FD for Forward Seismic Modeling

Bengt Fornberg, *University of Colorado, Boulder*

Seismic exploration is the primary tool for mapping out hydrocarbon deposits. In forward modeling, subsurface structures are assumed to be known, and the task is to simulate elastic wave propagation throughout the medium. Inversion programs then update subsurface assumptions in order to reconcile the model response with actual measurements. In collaboration with Royal Dutch Shell, we have found that RBF-FD (radial basis function generated finite difference) spatial discretization offers outstanding accuracy and algebraic simplicity for modeling elastic wave propagation, especially in layered media that feature large numbers of irregularly curved interfaces.