Michigan Tech

Mathematical Sciences Colloquium
Michigan Technological University
Thursday, March 26, 2015
1:00 P.M.

Fisher Hall 326

A fast algorithm for distributing nodes with variable density
Natasha Flyer

Institute of Mathematics Applied to Geosciences
National Center for Atmospheric Research

Discretizations of PDEs have traditionally relied on structured meshes. Requirements for geometric flexibility, both to conform to highly irregular geometries as in topographical and urban features as well as to achieve local refinement in critical areas, have led to an increased use of unstructured meshes, often in the form of polygonal-type elements. Parallel to this trend, radial basis function-generated finite differences (RBF-FD) is an altogether alternative novel approach that is mesh-free. It only requires a scattered distribution of nodes, without forming any associated `elements'. This makes it particularly easy to combine geometric flexibility, high levels of accuracy, and computational efficiency. Here, we describe an exceptionally fast algorithm for distributing nodes with variable density, depending on the desired resolution. Since it is not iterative, the user does not need to decide on trade-offs between computer time and distribution quality.