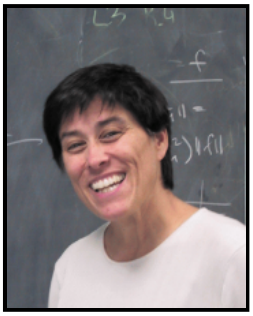

Frontiers of Scientific Computing Lecture Series

Computing Fluid Flows in Complex Geometry

Marsha Berger, Courant Institute

Johnston Hall 338
February 16, 2009 - 11:00 am

Abstract:
We give an overview of the difficulties in simulating fluid flow in complex geometry. The principal approaches use either overlapping or patched body-fitted grdis, unstructured grids, or Cartesian (non-body-fitted) grids, with our work focusing on the latter. Cartesian methods have the advantage that no explicit mesh generation is needed, greatly reducing the human effort involved in complex flow computations. However it is a challenge to find stable and accurate difference formulas for the irregular Cartesian cells cut by the boundary. We discuss some of the steps involved in preparing for and carrying out a fluid flow simulation in complicated geometry. We present some of the technical issues involved in this approach, including the special discretizations needed to avoid loss of accuracy and stability at the irregular cells, as well as how we obtain highly scalable parallel performance. This method is in routine use for aerodynamic calculations in several organizations, including NASA Ames Research Center. Many open problems are discussed.

Speaker's Bio:
Marsha Berger received her PhD from Stanford in 1982. Since then she has been at the Courant Institute of New York University, where she is a professor of computer science and mathematics. She is a frequent visitor to NASA Ames Research Center, where she spends every summer working with collaborators. She was elected to the National Academy of Science in 2000 and to the National Academy of Engineering in 2005.

Refreshments will be served.
This lecture has a reception.

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