



THE UNIVERSITY OF CHICAGO

Department of Statistics

SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

Per-Olof Persson

Department of Mathematics
University of California, Berkeley

High-Order Methods for Turbulent Flow Simulations on Deforming Domains

THURSDAY, May 26, 2016 at 4:30 PM
133 Eckhart Hall, 5734 S. University Avenue

ABSTRACT

It is widely believed that high-order accurate numerical methods, for example discontinuous Galerkin (DG) methods, will eventually replace the traditional low-order methods in the solution of many problems, including fluid flow, solid dynamics, and wave propagation. In this talk I will present some of the recent developments in our work on efficient and robust DG schemes for real-world problems with deforming domains. This includes fundamental topics such as the generation of high-quality unstructured curved meshes, the design of high-order compact and sparse numerical schemes, and scalable preconditioners for parallel iterative solvers. In addition, I will show how to obtain high-order accuracy for complex domain motions using unstructured space-time meshes, how to use implicit-explicit schemes to derive efficient partitioned time-integrators for fully coupled fluid-structure interaction problems, as well as a fully discrete adjoint method for PDE-constrained time-periodic optimization. The methods will be demonstrated on important practical problems, such as the inverse design of energetically optimal flapping and morphing wings, and the large eddy simulation of vertical axis wind turbines.

Organizers:

Lek-Heng Lim, Department of Statistics, lekheng@galton.uchicago.edu, Ridgway Scott, Departments of Computer Science and Mathematics, ridg@cs.uchicago.edu, Jonathan Weare, Department of Statistics and The James Franck Institute, weare@uchicago.edu. SSC Seminar URL: http://www.stat.uchicago.edu/seminars/SSC_seminars.shtml.

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