Computational Mathematics Seminar Series

A Staggered Discontinuous Galerkin Method for the Stokes System and its Fast Solvers by Domain Decomposition Methods

Hyea Hyun Kim, Kyung Hee University, Korea

Associate Professor, Department of Applied Mathematics

Lockett Hall 233
October 15, 2013 - 03:30 pm

Abstract:
In this talk, we will present a new staggered discontinuous Galerkin method for the Stokes system. The key feature of our method is that the discrete system preserves the structures of the continuous problem, which results from the use of our new staggered DG spaces. This also provides local and global conservation properties, which are desirable for fluid flow applications. The method is based on the first order mixed formulation involving pressure, velocity and velocity gradient. The velocity and velocity gradient are approximated by polynomials of the same degree while the choice of degree for pressure is flexible, namely the approximation degree for the pressure can be chosen as either that of velocity or one degree lower than that of velocity. In any case, stability and optimal convergence of the method are proved. Moreover, a super convergence result with respect to a discrete H1-norm for the velocity is proved. In addition, we present FETI-DP domain decomposition algorithms for fast solutions of our DG formulation.

Speaker's Bio:

Hyea Hyun Kim is an Associate Professor at the Kyung Hee University in Yongin, Korea. She obtained her Ph.D. in Applied Mathematics from the Korea Institute of Science and Technology (KAIST), where her thesis was on Preconditioners for FETI-DP formulations with Mortar Methods. Her research interests include numeral methods for partial differential equations, Domain decomposition methods, Mortar methods, Discontinuous Galerkin methods, Parallel computing, and Multiscale problems.

Center for Computation & Technology
2003 Digital Media Center • Telephone: +1 225/578-5890 • Fax: +1 225/578-8957