Multidisciplinary **S**imulation, **E**stimation, and **A**ssimilation **S**ystems
Seminar Series

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Implicit large eddy simulation of compressible flows using the hybridized discontinuous Galerkin approach

Abstract: In this talk, we will discuss the recent development of a class of hybridized DG methods for implicit large eddy simulation (ILES) of compressible flows. This class of DG methods encompass the hybridizable DG (HDG) method, the embedded DG (EDG) method, as well as new hybridized DG methods resulting from the marriage of the HDG method and the EDG method. While the HDG method is more accurate and robust that the EDG method, the latter is significantly less expensive than the former. This motives us to combine HDG and EDG to obtain new hybridized DG methods that enjoy the advantages of both HDG and EDG. However, this approach presents challenging issues in terms of domain decomposition preconditioners and parallelization because the resulting linear system has complicated sparsity structure. We will discuss our domain decomposition preconditioner and strategy to address some of the issues and leave other issues for future work. In addition, we will talk about various choices of the stabilization tensor and their influence on both nonlinear and linear convergence. Finally, we present ILES results and validate them against experimental data and other simulation data.
This is joint work with Pablo Fernandez and Jaime Peraire.

Biography: Dr. Nguyen's current research is focused on efficient methods for simulation of multiscale and multi-physics phenomena across disciplines and on uncertainty quantification techniques for inverse/design problems in engineering. He received his BE degree with first class honors in Aeronautical Engineering from HCMC, University of Technology in 2001, and his Ph.D. degree in High Performance Computation for Engineered Systems from National University of Singapore in 2005. Dr. Nguyen is the author and co-author of more than 25 research articles. He has presented his work in several major conferences, invited talks, and workshops.

Friday, Feb. 5, 2016
2:00PM; Rm. 5-314
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