MCEN GRADUATE SEMINAR

Yulia Peet, PhD

NSF Research and Teaching Fellow
Northwestern University
Department of Engineering Sciences and Applied Mathematics

Code Integration for Large-Scale Systems Simulations with Grid Overlapping Methods

January 19, 2012 3:30-4:45 ECCR 1B40

Abstract

With the advance in performance and capabilities of modern computers, the drive towards large-scale integrated simulations of complex flow systems is growing. Grid overlapping methods represent a powerful tool for simulating engineering problems in complex geometries, since they alleviate mesh generation process, provide a convenient way of resolution control and allow for modeling different physics in multiphysics systems. In this talk, we present a computational methodology for using the grid overlapping methods both in a framework of a single code with multiple domains, as well as multiple codes, such as compressible and low Mach number codes. We describe the details of implementation, formulate unsteady interface conditions, investigate numerical stability with and without iterations, and show the results of turbulent flow simulations performed with grid overlapping methods, including film cooling of gas turbine blades and applications in reactor thermal hydraulics.

Bio:

Yulia Peet is an NSF Research and Teaching Fellow at the Department of Engineering Sciences and Applied Mathematics at Northwestern University, and has a joint appointment as an Assistant Computational Scientist in the Mathematics and Computer Science Division at Argonne National Laboratory. She has degrees in aeronautics and astronautics from Stanford (Ph.D. '06), aerospace engineering (M.S. '99) and applied mathematics and physics (B.S. '97) from Moscow Institute of Physics and Technology in Russia. In addition, she received M.S. degree in management consulting (M.S. '00) from the State University - Higher School of Economics in Moscow. Peet has worked as a postdoctoral researcher at the University of Pierre and Marie Curie in Paris in 2006-2008. Her interests are in the area of computational fluid dynamics, turbulence simulations, finite-difference and spectral methods, and fluid-structure interaction.