INFORMS UH Lecture Series

SPRING 2009

Presents

Dr. Shahrouz Aliabadi

Jackson State University

Title: Integrated simulation tools for multi-scale storm surge and flood forecast

11:00 am -12:00 pm Friday, January 30, 2009

102 D, Eng. Building D2

Abstract

This presentation addresses one aspect of an on-going project at Jackson State University regarding homeland security in the state of Mississippi. The project proposes an integrated tool for multi-scale storm surge and flood forecast, as well as evaluation of the flood damage on coastal infrastructure including transportation systems in the three counties in the state of Mississippi. Specifically, this presentation describes the storm surge and wave models used for hurricane forecast and simulation, and the methodology that we use to integrate the results from flood modeling into geographical information systems for visualization, analysis and decision-making. The simulation and prediction of storm surges and waves are intrinsically complex due to the interaction of a wide range of fluid motions, ranging from large-scale tide and wave to small-scale street level turbulence. Multi-scale flood simulation becomes a reality due to the rapid development of computer technology, the maturity of computational simulation models, and the public available database such as hurricane forecast advisories and geographical data. A suite of state-of-the-art models are integrated and the results will be presented. Namely, sea surface elevation, wind forcing and coastal currents are modeled using the fully nonlinear, two-dimensional, barotropic hydrodynamic model ADCIRC-2DDI (ADvanced CIRCulation Model, two Dimensional Depth-Integrated) the open-source, third-generation spectral wave prediction model SWAN (Simulation of WAves in Near-shore area) is run interactively with ADCIRC. The predicted wave profile will be imported into our CFD solver CaMEL hybrid that uses a hybrid finite volume and finite element method for solving incompressible free-surface flows. The CFD prediction results will be then imported into GIS software and Google Earth using computer graphics techniques.
In addition, we will describe over recent work in overland flow simulations. As a case study, we have modeled the overland flow caused bv hurricane Katrina.

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If you have any questions regarding this event, please contact Dr. Gino Lim at 713-743-4194 or at ginolim@uh.edu.