DEPARTMENT OF CIVIL ENGINEERING AND GEOLOGICAL SCIENCES

Spring 2011 Seminar Series

CHALLENGES AND INNOVATION IN CIVIL AND ENVIRONMENTAL ENGINEERING

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Hurricane Winds: Inside the Storm and at the Laboratory

Thursday, March 24, 2011

3:30pm, 129 DeBartolo

Progress toward cost-effectively mitigating wind damage from hurricanes is reliant upon efforts to quantify the complex interactions between the wind and structures. Much remains unknown about the behavior of wind as it transitions from water to land. The speed and turbulence of hurricane winds change dramatically as the storm moves from open water to land. However, the methodology to estimate hurricane wind behavior is based on measurements over the open ocean. This information is combined with sparse and incomplete overland ground observations to guesstimate the winds to which the infrastructure is subjected. Thus, current design and mitigation methodologies are based upon an enormously uncertain and incomplete understanding of how hurricane winds load and damage structures. The ultimate effectiveness of mitigation also carries this uncertainty. Without accurate ground level wind data, decisions regarding preparedness, policy and codes and standards are made with inadequate knowledge of risk and vulnerability. This talk will present a program to directly measure overland hurricane winds (speed, direction, turbulence) using portable weather observation platforms, and the direct measurement of hurricane wind loads on structures.

The capacity of building components and systems to resist extreme wind loading is also poorly defined. As codes in Florida have evolved to improve wind resistance, other issues have emerged such as rain water ingress and aging effects on performance. Companion research to test full-scale building systems under laboratory controlled hurricane wind and rain conditions will also be presented.

Dr. Gurley is an Associate Professor in the Department of Civil and Coastal Engineering at the University of Florida. His primary areas of research are wind effects on residential structures, and stochastic modeling of extreme winds and structural resistance. After receiving a Ph.D. from Notre Dame in 1997, Dr. Gurley has largely focused on in-field measurement and modeling of ground-level hurricane winds and wind loads, working with colleagues, students, and partnering universities to capture full-scale hurricane wind velocity and dynamic pressures on occupied coastal residential structures. This field data is coupled with post-storm residential damage assessments, laboratory evaluations of component capacities, and wind tunnel studies to model the vulnerability of typical residential structures to hurricane wind damage. The research output from Dr. Gurley and his colleagues contributes to a variety of hazard preparation and response efforts including storm intensity ratings, damage assessments, mitigation, building science, and codes and standards. Dr. Gurley is an associate editor for ASCE Journal of Structural Engineering, and a past member of the Board of Directors for the American Association for Wind Engineering.