Hurricane Ike, Gust Front and a Potpourri of Issue in Wind Engineering

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On September 13, 2008, Hurricane Ike made landfall on the Texas coast, with the eye of the storm passing just east of the city of Houston. The storm caused major damage along the upper Texas coast and the Houston-Galveston corridor in some ways similar to that caused by Hurricane Alicia in 1983. This presentation will cover damage to coastal structures and its comparison to the damage observed in Alicia. Like Alicia, Ike caused glass damage in the Central Business District of Houston though the enormity of damage was at a lesser scale than in Alicia. Some historical perspective to glass damage in hurricanes and some insight into the performance of the J P Morgan Chase Tower and adjacent parking structure in Houston will be discussed. The tower is bounded by a series of prismatic buildings, whose arrangement and angle of attack to the hurricane flow field led to the entrapment of vortical structures between the tower itself and the neighboring parking structure. These two buildings experienced extensive damage to the glass and cladding on the lower floors along their neighboring street, as the broken glass chards ricocheted between them.

The presentation will highlight some of the salient features of gust front winds, their characterization, modeling and simulation. Also an introduction to a Gust Front Factor recently proposed that facilitates codification of load effects of gust front winds.

A discussion on the role of wind engineering in the wind energy area with special reference to wind field characteristics and their dynamic load effects will be presented. Also a brief primer on the current debate on the impact of climate change on the intensity and frequency of hurricanes will be included to promote discussion among wind engineers on this important weather phenomenon with the potential of high impact on constructed facilities in the coastal areas.

Finally, a synopsis of recent efforts in the development of VORTEX-Winds *a virtual organization to reduce the toll of extreme winds* on society will be outlined. The basic vision of the VORTEX-Winds is the development of a collaboratory for research and education to overcome the barriers in understanding and modeling wind effects on civil infrastructure to counter the escalating loss of property and life. The virtual organization employs cyberinfrastructure that facilitates real-time, shared access to integrated analysis/modeling/simulation and services aids using geographically dispersed databases, specialized design/analysis tools, experimental facilities, full-scale monitoring networks, as well as providing a domain knowledge-base.