Widespread Structural Damage to critical facilities such as levees, buildings, dams and bridges during Hurricanes has exemplified a major design philosophy flaw. Current design standards lack guidance on improving the performance of a structure under extreme loads. These inadequate standards warrant the use of more accurate methods describe the anticipated structural response and damage to extreme loads. Performance Based Engineering was founded on these principles, which was extended into the field of Hurricane Engineering in this study.

A vital step in application of this method involves collection of the numerous hazards data from sources such as historical records, laboratory experiments or stochastic simulations. However, the hazards associated with a hurricane are vastly different from other hazards such as seismic acceleration. The spatial and temporal variation of this loading spectrum requires much more detailed collection of each hazard. Additionally the structure type, configuration and orientation all affect the loading distribution of the hazard. This requirement has restricted the widespread use of PBE in Hurricane hazards.

At the same time computational power and computer aided design have evolved a totally different technique of collecting the structure specific hazard data. This new technique known as Computational Fluid Dynamics was applied to the wind and wave hazards to accurately quantify the spectrum of dynamic loads in this study. Numerical simulation is presented on verification of this technique with laboratory experimental studies and further application to a typical Florida building and bridge prototype. Results show that CFD is a viable option to wind and wave laboratory studies and a key tool for the development of PBE in the field of Hurricane Engineering.

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The public is welcome to attend.