

# Effective Forensic Engineering Investigations of Hurricane “Wind vs. Water” Disputes: Techniques and Tools

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## ABSTRACT

Hurricane Katrina made landfall near the mouth of the Mississippi River in Southeast Louisiana and again at the Pearl River delta on the Louisiana/Mississippi border on the morning of August 29, 2005 as a Category 3 intensity storm on the Saffir-Simpson Scale. Katrina brought high winds and devastating storm surge to locations across southeast Louisiana and coastal Mississippi, destroying many homes and other structures as it passed. In the aftermath, many homeowners and business owners with properties in flooded areas found themselves engaged in disputes with their insurers over the distribution of their flood and wind policy claims. Resolving these disagreements depends critically on a technical understanding of the damage mechanisms associated with the actions of wind and flooding on structures. Members of Engensus have been retained as expert consultants and witnesses by law firms representing insurance companies in several such disputes. The purpose of this paper is to share our experience in Louisiana by presenting reasonable approaches to answering questions regarding the likely causes of structural damage in areas subjected to both high wind and flooding, by calling attention to some areas in which we feel there is room for improvement among engineers engaged in this work, and by providing examples of effective analysis techniques.

Among the key components of an effective forensic investigation of structural damage in a wind versus flood claim are: (1) an objective, site-specific inquiry into the wind and flood conditions for the property; (2) reconnaissance of the local geography through the use of maps, aerial imagery, and digital elevation data; (3) a thorough site inspection documenting physical evidence not only at the subject property, but also in the surrounding areas; and (4) an engineering analysis of the wind and flood loads and also the approximate resistance capacity of the structure under the action of these loads. Carrying out these steps requires not only fluency in structural engineering, but also familiarity with meteorology, wind engineering, hydraulics, coastal engineering, and Geographic Information Systems (GIS) techniques. This paper will describe many of the resources, tools, and analysis techniques that can aid in this process. Practical examples and counterexamples illustrating the appropriate application of these investigation techniques will be provided in the paper. Following these steps objectively and skillfully will allow an engineer to offer a reasoned opinion on the most likely damage mechanisms for structures damaged during high wind and flood events.