

Common Misconceptions in Determining Wind-Water Damage Causation

J. Arn Womble, Ph.D., P.E., M.ASCE (*corresponding author*)

Wind Engineering Consultant, LNSS/WindForce Associates

Instructor-Texas Tech University

5716 – 73rd Street, Lubbock, TX 79424

Phone: (806) 543-1169 Fax: (806) 698-0498

ArnWomble@aol.com

Douglas A. Smith, Ph.D., P.E., M.ASCE

Professor, Wind Science and Engineering Research Center

Principal, LNSS and Associates

Box 41023

Lubbock, TX 79409

doug.smith@ttu.edu

Recent severe storms such as Hurricane Katrina (2005) have resulted in questions of whether wind or water (storm surge) was responsible for destroying structures. Engineering reports have been prepared in support of both sides of this issue for legal challenges regarding insurance policies which include wind damage but exclude storm-surge damage. In reviewing a number of reports prepared in support of the theory that wind – and not storm surge – is responsible for destruction of certain structures, we have observed a host of theories that are implausible and that can be potentially misleading.

These theories appear to stem primarily from a misunderstanding of wind and storm-surge action, from selective and incomplete use of physical principles, from the use of incorrect or inapplicable data, from a misunderstanding of the behavior of structures under extreme loads, and/or from incomplete analysis of clues provided by the damaged structure and its surroundings.

Physical principles that are mistakenly or partially applied include fluid-structure interaction, buoyancy, and transport of structures and debris. Among the data improperly employed in recent analyses are unverified and non-standardized wind speeds and data from preliminary (non-calibrated) numerical models. Improper application of the EF-Scale relating tornado damage to wind speed ranges to *hurricane* damage also has become commonplace. The supposition that tornado damage is responsible for the “selective” destruction of structures has also been mistakenly used in place of considering variations in structural resistance.

This paper examines a number of the more common misconceptions and provides guidance for application of the appropriate physical principles.

Suggested Track/Topic: Wind design and analysis