

Abstract Submitted  
for the DFD07 Meeting of  
The American Physical Society

**Flow structures around a gable-roofed building model in tornado-like winds**<sup>1</sup> ZIFENG YANG, VASANTH BALARAMUDU, FRED HAAN, PARTHA SARKAR, HUI HU, Aerospace Engineering Dept., Iowa State University — Tornadoes are violently rotating columns of air which are considered as nature's most violent storms. In an average year, 800 ~ 1000 tornados would occur in the U.S. alone, and cause about 80 deaths (on average), over 1500 injuries, and \$850 million worth of property damage. By using the world-largest tornado simulator of Iowa State University, a comprehensive experimental investigation was conducted to characterize the flow structures around a low-rise, gable-roofed building model in tornado-like winds. While pressure taps and force transducers were used to map the pressure distributions around the building model and measure the aerodynamic forces acting on the building model induced by the tornado-like winds, a high-resolution Particle Image Velocimetry (PIV) system was used to conduct detailed flow velocity field measurements around the gable-roofed building model. The ultimate objective of the present study is to quantify the surface winds generated by tornadoes and flow-structure interactions between tornadoes and built environments to assess wind-induced damage with the purpose of mitigating damage and improving public safety.

<sup>1</sup>Supported by NOAA, Project No. NA060AR4600230

Hui Hu  
Aerospace Engineering Dept., Iowa State University

Date submitted: 23 Jul 2007

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