Wind Engineering Research Group





ABSTRACT

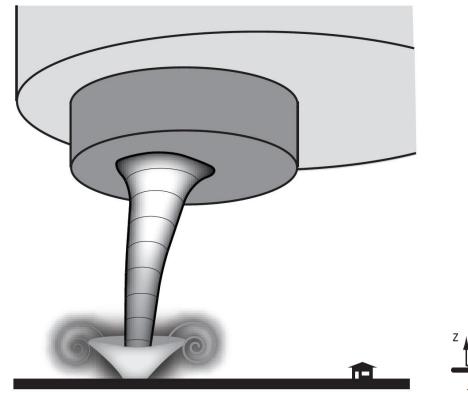
The thrust of the research is to propose a novel framework by which damages of vertical structures are characterized with respect to model parameters describing a thunderstorm downburst or tornado. Structural damages are assessed with surrogate models developed from machine learning algorithms. Numerical simulations are complemented with wind tunnel experimentation using an innovative flow-altering device. Successful application of this approach can ultimately provide vital knowledge related to the structural performance of the built environment impacted by thunderstorm wind loads from both engineering (hazard and fragility curves) and economic perspectives (life-cycle costs).

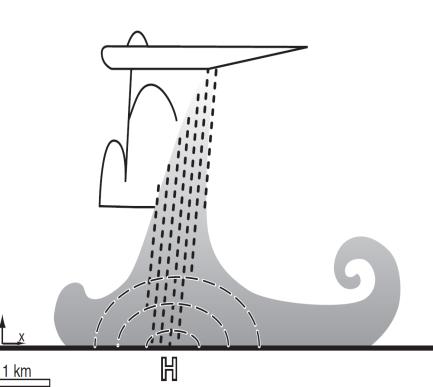
INTRODUCTION

Thunderstorm Downbursts and

Tornadoes

• Present challenging structural engineering problems due to intense wind loading





Performance-based Wind Engineering (PBWE)

•Ensure a structure satisfies **performance objectives**

- For example:
- Interstory drift
- Motion perception
- Operation of elevators
- Nonstructural component (equipment) damage



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Performance-based Evaluation of Structures Impacted by Winds from Thunderstorm Systems via Surrogate Modeling Viet Le, Ph.D. Candidate; Luca Caracoglia, Associate Professor PhD Research Expo Department of Civil and Environmental Engineering Northeastern University, Boston, MA February 20, 2020

