

Keynote Paper

Physical and Numerical Modelling of Tornado-like Vortices for Wind Engineering Applications

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ABSTRACT

Tornadoes are strong vortices with high wind speeds that cause severe damage to structures. For a structure attacked by a tornado, some important features such as pressure suction on outer building surfaces during the passage of the tornado and dynamic loading from the tornado have been previously identified. Due to the significant impacts on societies caused by recent catastrophic tornadoes, the tornado-related research has become a research hotspot in the wind engineering field in China. This paper presents recent work of physical and numerical simulations of tornado-like vortices and their applications to the investigation of tornado-induced loads on various structures, which are carried out at Tongji University, China. The effects of opening ratio, single central opening azimuth and radial distance between the building model and tornado-like vortex on external and internal wind pressure distributions are analyzed. The present study shows that the tornado-flow characteristics are significantly dependent on the mechanism to create the swirl flow, thus more efforts are necessary to investigate the key scaling factors in tornado-load simulations.

REFERENCE

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