The Evolving Metropolis
2019 IABSE Congress
New York City

IABSE 90 YEARS

Section-Model Wind Tunnel Test for Flexible Suspended Pedestrian Bridges

Rudolf T. STAROSSEK
B.Sc., Master's Student
Seoul National University
Seoul, South Korea
rstarossek@snu.ac.kr

The author graduated with a Bachelor's degree at RWTH Aachen and is currently a Master's student at Seoul National University.

Sejin KIM
M.Sc., Ph.D. Candidate
Seoul National University
Seoul, South Korea
sejin09@snu.ac.kr

Se-Jin Kim received his bachelor's and master's degree at Seoul National University. Currently he is a Ph.D. candidate at SNU.

Ho-Kyung KIM
Prof. Ph.D.
Seoul National University
Seoul, South Korea
hokyungk@snu.ac.kr

Ho-Kyung Kim received his doctor's degree and currently professor at Seoul National University. He is director of the Korea Bridge Design and Engineering Research Center.

Contact: rstarossek@snu.ac.kr

1 Abstract

For most bridge decks certain assumptions and simplifications can be made in order to observe the wind interactions in a "2-D" sectional manner. In case of flexible simple suspended pedestrian bridges, the three-dimensional behavior in a mode is dominant, due to structural and dynamic properties highly different to general cable-supported bridges, therefore special considerations have to be made in section-model tests.

Typically, the section-model wind tunnel test does focus on the dominant vertical and rotational natural modes of the bridge deck, while the lateral mode is suppressed as non-governing. Since the lateral and rotational modes of the suspended pedestrian bridge occur in a coupled manner in the primary mode shape, they have to be examined as well. Various different methods to include these different behaviors in analysis and tests are discussed and applied on a case study object.

The paper will propose a modified section-model wind tunnel testing setup for a flexible suspended pedestrian bridge on the case study object of the Sogeum Mountain Suspended Pedestrian Bridge in Korea, where a section-model was made for the conventional wind-stability study in the wind tunnel.

Keywords: pedestrian bridge; simple suspension bridge; free vibration section wind tunnel test

2 Introduction

The aerodynamic behavior of long-span cable stayed and suspension bridges is well studied and various methods and procedures of verifying the safety under wind exist by either analysis or wind tunnel test. The most common and cost efficient testing method would be the section model test in the wind tunnel, where the governing structural dynamic behavior, aerodynamic properties, and its interactions can be accurately observed. As the geometric shape of bridge decks usually repeat themselves over the length, it is sufficient to observe and analyze in a sectional per length manner. A small length of the deck at the point with the governing structural dynamic properties is modelled at the preferred geometric scale. [1][2]

Due to the simplifying nature of the section wind tunnel test, some assumptions have to be made, which may not be valid for other types of bridges. In this case the simple suspended pedestrian bridge is reviewed in regards to these simplifications.

https://doi.org/10.2749/newyork.2019.2030
Distributed by Structurae
2030