The evaluation of aerodynamic capacity for a bridge cross section applying a new type of fairing

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Summary

In recent years, length of bridge is longer and longer according to develop new material and construction technology. To evaluate wind effect on a bridge has became main issue because bridge main span is longer. This study is to improve wind capacity of a bridge. As applying new type fairing, wind resistance of a bridge is improved.

Keywords: bridge cross section; fairing; wind tunnel test; wind coefficient; aerodynamic; flutter; CFD; wind resistance.

1. Introduction

In recent years, length of bridge is longer and longer according to develop new material and construction technology. To evaluate wind effect on a bridge has became main issue because bridge main span is longer. To evaluate behavior under wind induced is divided to: static and dynamic efficiency. The static efficiency is a factor which is determined by wind load and evaluated by drag coefficient, lift coefficient and pitching moment coefficient. The dynamic efficiency evaluates a harmful vibration like vortex shedding, flutter and buffeting. Through the development of the bridge cross section can be improved the static and dynamic wind resistance performance. For example, Recently there is a new type section which is a twin-box section, improved by many researches. In addition, a section of triple-box shape is constructing, now. Also, researches about fairing and railing have been progressing constantly. This study is one of them. As applying new type fairing, wind capacity of a bridge is improved.

We applied new concept that is transmission; the ratio of fairing gab area with entire fairing area. Under the change of transmission of fairing, effect of behavior under wind induced is evaluated.

2. Direction of this study

At first, assume virtual cross section of steel box bridge including fairing part. Next is determining length parameters and natural frequency, mass, mass moment of inertia, etc. After dividing structural part and non structural part, decide fairing part in the non structural part and apply the transmission on the fairing. The transmission is realized from idealizing

Table 1: Parameters of virtual cross section

title	Value
Vertical frequency	0.1947
Torsional frequency	0.5044
V/T ratio	2.5910
Mass	17.906 (kN/g/m)
Mass moment of inertia	898.79 (kN/g • m2 /m)

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