



Izmit Bay Suspension Bridge-Aerodynamic Stability of Catwalk

Hidesaku UEJIMA
Civil Engineer
IHI Corporation,
Yokohama, Japan
hidesaku_uejima@ihi.co.jp

Kunihiro YAMAUCHI
Civil Engineer
IHI Corporation,
Yokohama, Japan
kunihiro_yamauchi@ihi.co.jp

Mototsugu ONO
Bridge Engineer
IHI Infrastructure System
Osaka, Japan
mototsugu_ono@iis.ihi.co.jp

Manabu INOUE
Bridge Engineer
IHI Infrastructure System
Tokyo, Japan
manabu_inoue@iis.ihi.co.jp

Ryoichi KISHI
Bridge Engineer
IHI Infrastructure System
Tokyo, Japan
ryoichi_kishi@iis.ihi.co.jp

Yasutsugu YAMASAKI
Bridge Engineer
IHI Infrastructure System
Tokyo, Japan
yasutsugu_yamasaki@iis.ihi.co.jp

Summary

The catwalk system for the Izmit Bay Suspension Bridge designed without storm system has been assessed for its aero-elastic stability carefully. The behavior of the catwalk under the design wind speed has been evaluated by means of a nonlinear numerical analysis using a space frame numerical model with the aerodynamic properties obtained in a wind tunnel tests using a section model of the catwalk of a scale of 1/4. The wind tunnel tests using a full aero-elastic model of the catwalk system for a shorter main span suspension bridge but with the same catwalk section as for the Izmit Bay Suspension Bridge have been conducted. The tests aimed to investigate the wind-induced response under the yaw wind and to prove the nonlinear numerical analysis employed for investigation of the behavior of the catwalk system of the Izmit Bay Suspension Bridge. It has been confirmed that the static and dynamic responses of the catwalk of the Izmit Bay Suspension Bridge are well within the permissible capacity under the design wind speed.

Keywords: catwalk; wind tunnel test; aerodynamic stability

1. Introduction

The Izmit Bay Suspension Bridge is a suspension bridge having a main span of 1550m crossing the Sea of Marmara at the Bay of Izmit in northern Turkey as a part of the new 420 km Gebze-Orhangazi-Izmir motorway under construction to be completed early 2016.

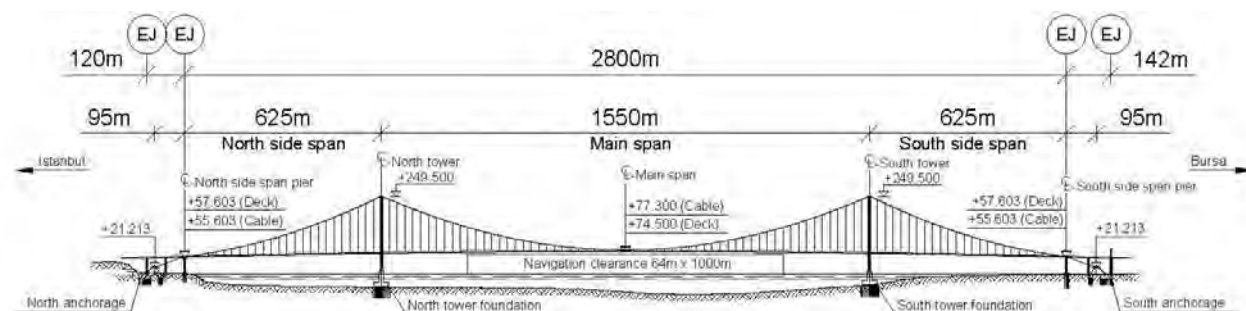


Fig.1: General Arrangement

Aero-elastic stability is an important technical issue for a catwalk system because it is a cable structure with extremely small dead weight. The foremost priority is to secure strength and stability under strong wind considered at the bridge site. The aerostatic instability due to overturning moment also needs to be prevented.

Storm ropes are commonly employed so as to add stiffness to the catwalk system hence suppress a wind-induced deformation and vibration. However as a span length gets longer, the benefit of the