Challenges and Innovations in Design and Construction of Supersized Structural Components for Long Span Bridges

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Abstract

For better cooperating river-crossing highway and railway with waterway transportations, larger spanning capability of a bridges is more demanding than ever before. Larger spans lead to supersized structural components, bringing new technical challenges to the design and construction of bridges. This paper summarizes several recent engineering innovations in the design and construction of supersized structural components for super long span bridges, including thermal-adapting tower-deck restraint system, spatial diamond-shaped tower, steel-box and core-concrete composite anchorage system, scour-mitigating skirted caisson foundation, and vortex-induced-vibration control of the main girder, so as to provide viable solutions for the design and construction challenges brought by supersized structural components of long span bridges.

Keywords: structural scale; thermal-adapting tower-deck restraint system; spatial diamond-shaped tower; steel-box and core-concrete composite anchorage system; scour-mitigating skirted caisson foundation; VIV; long-span bridge.

1 Introduction

Cable-stayed and suspension bridges are two common structural types of long-span bridges in China. The spanning capability of the bridge has significantly increased with the development and construction of bridges in China. In terms of highway cable-stayed bridges, the first cable-stayed bridge is the Yunyang Tangxi River Bridge, which was built in 1975 with a main span of only 76 m. Shanghai Nanpu Bridge was opened in 1991 and adopted the composite girder with a main

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