



Key Technology and Innovation Design of Chongqing Dongshuimen Yangtze River Bridge

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Abstract

Chongqing Dongshuimen Yangtze River Bridge is an extradosed cable-stayed bridge with a 445m-long main span. It has two shuttle-shaped pylons and a single plane of stay cable. The girders are double-deck steel truss structures with orthotropic plates and two planes of main truss. Its upper and lower decks carry four lanes of traffic and two transit tracks, respectively. The complicated load-bearing behavior of Dongshuimen Bridge made its design rather difficult. This bridge utilizes the sparse cable system, and each pylon carries 9 pairs of 139-strand stay cable. The magnitude of maximum tension force in stay cables, which is approximately 1500 ton, is currently the biggest in China. At one end, the stay cable is innovatively anchored in external steel anchorage boxes which are connected to two separated pylon limbs by shear studs. In this way, the cable force is balanced by shear studs, anchorage boxes and frictional force altogether. At another end, the anchorage of stay cables to the main girder is through large-scale steel boxes. For the construction of Dongshuimen Bridge, a device is developed specifically for the tensioning and adjusting of super-tonnage steel-strand stay cables. In order to provide theoretical foundation for the design of this bridge, research projects such as analytical and experimental studies on load transfer mechanism of plate truss composite system, the fatigue of super-tonnage steel-strand stay-cable, full-scale experimental study of external steel anchor box and etc. were carried out. The abundant research fruit and innovation achieved from those studies not only strongly supported the smooth construction of Dongshuimen Bridge, but also can be used as reference for the design of similar bridges in the future.

Keywords: cable-stayed; extradosed ; steel deck; anchorage box; steel-strand.

1 Introduction

The Chongqing Dongshuimen Yangtze River Bridge is a combined partially cable-stayed bridge, and is about 3.35 kilometers away from both the

Shibanpo Bridge and ChaoTianMen Bridge. It is the first bridge in Yuzhong peninsula, connecting middle and south areas of Yuzhong district. The bridge, with a total length of 1124.947 m and 24 m width deck section, has two pylons and a single-