Lancang River Railway Arch Bridge with stiffened skeleton of Concrete-filled Steel Tubes

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Abstract

The Lancang River railway arch bridge, a key project, is located on Dali~Ruili Railway with a design speed of 140 km/h. The bridge spans over the Lancang River, with the max slope angle of the mountain body on both sides of the river being more than 80 degrees. The distance between the bridge deck and the river surface exceeds 270 m. The whole bridge is 528.1 m long and the main span is 342 m. The x-style arch rib is a deck-type concrete-filled steel tube stiffened skeleton, which becomes the main arch structure of single-box single-cell box section after swing erection, by means of filling the inner space and covering the outer face with concrete.

Keywords: stiffened skeleton; concrete-filled steel tube; x-style arch bridge.

1 Introduction

The railway from Dali to Ruili, which is located in the western area of Yunnan Province and 330 km long, is the national class I electrified railway with the designed speed of 140 km/h. This railway is an important part of the west route of the "Trans-Asian Railway Network", and will connect with the Bangladesh–China–India–Myanmar railway. The bridge spans over the Lancang River. The max slope angle of the mountain on both sides is more than 80 degrees. The bridge deck stands more than 270 m (890 feet) over the Lancang River, which makes it as one of the highest safety risk bridges under construction in China.

The bridge is 528.1 m long, and the main span is 342 m. The X-style arch rib is a deck-type concrete-filled steel tube stiffened skeleton, which is filled with concrete inside and outside. The concrete-filled steel tube stiffened skeleton is used as the bracket to pour concrete around. After swing erection and being closed, stiffened skeleton become a main arch structure with single-cell single-box section. Then the piers on the arch rib and the box girder pushing platform are constructed. The platform is supported by the brackets on the arch rib and the abutment. The first segment of the beam is poured, and then prepared to be pushed to the accurate position. The other box girders are constructed like this, except the vault is the cast-in-place Π-shaped beam.

This kind of bridge has advantages as follows.

Firstly, the stiffened skeleton is used as the bracket for pouring the arch rib concrete, which will greatly save the cost, and also can work as the reinforcement of the concrete section [1].

Secondly, Arch bridge has good anti-wind and anti-seismic capability. These make it suitable for the requirements of the railway bridges.

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