

Adaptive Geometrical Construction Control Method of Super Long Span Cable Stayed Bridges

Qiao LI

Professor
School of Civil Engrg.
Southwest Jiaotong University
Chengdu, Sichuan 610031,
P.R.China
QL3721@vip.163.com



Qiao Li, born in 1954, received his civil engineering PhD from the Southwest Jiaotong University (SWJTU), P.R.China. He is a professor of civil engineering at SWJTU. His main research area is related to the construction control and health monitoring of bridge structures.

Yizhi BU

Professor
School of Civil Engrg.
Southwest Jiaotong University
Chengdu, Sichuan 610031,
P.R.China
yizhibu@163.com

Yizhi Bu, born 1961, received his civil engng. PhD from SWJTU.

Qinhua ZHANG

Associate Professor
School of Civil Engrg.
Southwest Jiaotong University
Chengdu, Sichuan 610031,
P.R.China
swjtuzqh@126.com

Qinhua Zhang, born 1975, received his civil engng. PhD from SWJTU.

Summary

The method of profile and internal force control during the construction of super long span cable stayed bridges is introduced. A new strategy, the adaptive geometrical control concept, has been used in this method. Comparing with traditional construction control method in which the cable tension is the main control means, the method introduced here can apparently improve the geometric profile and the state of internal forces of the bridge when the construction completed, decrease the influence of surveying errors caused by the vibration of the long cantilever girder and the temperature change of environment. The principle of the method has been described. The control system and its establishment for long span cable stayed bridges are introduced. The method has been successfully used in the construction control of Sutong Yangtze River Bridge with 1088m main span which is the longest span cable stayed bridge in the world and Edong Yangtze River Bridge with 926m main span, and is being used in the Jiashao Bridge which is a 6-tower cable stayed bridge with main span of 428m. Through the practices of Sutong Bridge and Edong Bridge, it is proved that the new method is effective and advantages mentioned above can be used.

Keywords: cable-stayed bridge, construction control, geometry control rules, adaptive control, whole-process control.

1. Introduction

In the last decades, cable stayed bridges have been developed rapidly and their spans became longer and longer with the development of the theories and key technologies. The span record was updated from 490m to 890m in 1990s. After getting in this century, several cable stayed bridges with the span over 900m were built in China, such as Sutong Yangtze River Bridge finished in 2007, a steel cable stayed bridge with span of 1088m which is the longest cable stayed bridge in the world (see Fig. 1), Edong Yangtze River Bridge finished in 2010, a concrete-steel hybrid (concrete beams