

Study on Small and Medium Continuous Beams in Beijing-Shanghai High-speed Railway

Wenshuo LIU

Graduate Student,
Central South University,
Changsha, China
together7299@163.com

Wenshuo Liu, born 1985, received civil engineering degree from Central South University. She is studying at the department of bridge engineering of Central South University as a Ph.D.



Gonglian DAI

Professor,
Central South University,
Changsha, China
daigong@vip.sina.com

Gonglian Dai, born 1964, received engineering PHD degree from Central South University. He is the dean of department of bridge engineering in Central South University now.



Summary

Continuous beam is the most frequently used bridge type in Beijing-Shanghai (Jing-Hu) high-speed railway (HSR), because it has been regarded as an effective way across the existed lines or different obstacles. In this paper, based on the study of a series of prestressed concrete (PC) continuous bridges with main span of 40m, 48m, 56m, 64m, 72m and 80m, major features of different spans has been described, such as structure parameters, mechanical characters and material amount. Then, the difference of bearing capacity and post-construction creep of bridges between cantilever casting method and cast-scaffold method has been compared.

By thorough analysis on stress variation and changing of creep after the construction in the whole life cycle, it is pointed out that the design of bridges should be able to meet the specifications in the whole life cycle, especially the stress of the short period after the operation and the deformation of the latter of the operation period should be controlled. Improvements and innovation are also proposed for future continuous beams.

Keywords: high-speed railway; continuous bridges; structure parameters; construction method; service life-cycle

1. Project Introduction

Beijing-Shanghai high-speed railway, the 1,318km new line with the operating speed of 350km/h from Beijing to Shanghai, stands for the highest level on construction of the high-speed railway in the world, because it has the longest mileage as well as the highest technical standard among all the high-speed railways under construction. This new line paralleling the existing Beijing-Shanghai railway is the arterial line in the north-south direction, connecting two of the most important economic zones in China: the Bohai Sea Rim and the Yangtze River Delta. Construction began in 2008, and it is expected to be completed in 2011. By then, the travel time between Beijing and Shanghai will be cut to 4 hours from 10 hours.

Beijing-Shanghai HSR covers a wide area and run through Beijing, Tianjin, Hebei, Shandong, Jiangsu and Zhejiang, 7 provinces and cities in all. Plains and low hills are the main terrain along the new line, but the geological circumstance is complicated, with the liquefied layer, soft soil, collapsible loess, ground settlement, coal field, etc. The areas covered by this line are the most developed areas in China, with accessible traffic and spread water conservancy facilities and rivers, so the route needs to cross various barriers, such as roads, highways, railways, navigable rivers and populous cities. Though the duties



Fig. 1: Route of Beijing-Shanghai HSR