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Study on Structure and Stiffness Indexes Long span Road-Rail Suspension Bridge

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ABSTRACT

It is rapidly developing the construction of long-span suspension bridges in China. It is an important issue for the structural design of suspension bridges. It is a problem that needs further study for high-speed and heavy-haul railway suspension bridges. There is the characteristics of heavy train live loads, high speed and high demand for running security and passenger comfort, the technical standards and so on. The paper is analysis the stiffness evaluation indexes of railway suspension bridges adopted by the codes of various countries in the world, and compares them with the regulations in China's general bridge codes. The key technologies of the thousand-meter-scale road-rail suspension bridges for high speed for passenger trains, 120 km/h for freight trains) and heavy load are studied. Based on the research on the road-rail suspension bridge with main span of 1 196 m, the influences of different supporting systems, arrangement of auxiliary piers, ratio of height to span, ratio of width to span and ratio of vertical to span on the vertical and lateral stiffness of the bridge are analysis, and the stiffness evaluation indexes and suggested values for thousand-meter-scale road-rail suspension bridges are proposed. The proposed long-span suspension bridge scheme is technically feasible, economically reasonable, and has good horizontal and vertical stiffness, smoothness and running comfort.

Keywords: Long-span suspension bridge ; road -rail bridge; high-speed railway; heavy-haul railway ; statical analysis ; structural parameters ; stiffness indexes

1 INTRODUCTION

It is rapidly developing the construction of long-span suspension bridges in China. In recent years, a number of over 1 km-level suspension bridges have been built in China, as shown in Table 1.

It is an important issue for the structural design of suspension bridges. There is still a lack of corresponding specifications for long-span railway bridges in various countries, and there is a lack of clear limit value standards for horizontal and vertical stiffness. The specifications that can be referred to are based on the dynamic analysis and actual test of small-span bridges. For the live load system, China's current specifications have clear values for the vertical static live load, dynamic coefficient, impact coefficient and other indicators in the live load of railway bridges, but they do not clearly specify the parameters involved in railway and dual-use suspension bridges.