

Test of Wind Parameters and Cable Vibration of Shenzhen Bay Bridge

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Summary

Based on the structural health monitoring system of Shenzhen Bay Bridge, the wind parameters and cable vibration properties are acquired by analyzing the test data during the two typhoons period in 2007. The result shows that the horizontal fluctuating wind power spectrum is consistent with the SIMIU spectrum and the vertical fluctuating wind power spectrum is basically consistent with the PANOFISKY spectrum. Moreover, the side span cables appeared a significant rain-wind induced vibration, while the vibration amplitude of long cables in the main span has been effectively controlled because of the installation of cable dampers. The short cable in bridges similar to Shenzhen Bay Bridge should be considered to take additional damping device or auxiliary cables.

Keywords: wind; spectrum; fluctuating; cable; vibration.

1. Introduction

Wind-resistant design is the key section of the long-span bridge design. At the design phase, the wind tunnel model tests and numerical wind tunnel are generally used for the simulation. Though the existing bridge wind-resistant theory can provide a reliable basis for safety, the mechanism of wind-induced vibration is still the research focus in various countries. On the last decade, the rise of long-span bridge structural health monitoring system provides us a convenient condition to obtain the real environment and the vibration response of the structure. It supplies a wealth of data and useful information for wind study. Therefore, this paper analyzed the test data of Shenzhen Bay Bridge structural health monitoring system during typhoon period in 2007. The analysis has special reference to wind-resistant design of same type of bridges and bridges in same regions.



The Shenzhen-Hong Kong Western Corridor is the bridge constructed together by Hong Kong and Mainland, linking Hong Kong and Shenzhen across Shenzhen Bay. Its total length is about 5.5km. It consists of two cable-stayed bridges and a series of continuous beam bridges. Both have single inclined tower and single cable plane. The bridge in Shenzhen side has three spans with the length of 180+90+75m. The tower is the concrete structure and the girder is a steel box structure with the width of 38.6m, Bridge construction began in 2003 and was completed in 2007. See figure 1.

Fig. 1: Shenzhen-Hong Kong Bridge, in China