Cable Stress Monitoring for a Cable Stayed Bridge

Y. CAO and M. L. WANG

ABSTRACT

This paper reported the implementation of cable stress monitoring for a cable stayed bridge. A Structural Health Monitoring (SHM) system was installed to a cable stayed bridge with main span of 480m, upon its completion in December 2006. Electro-Magnetic (EM) sensors were used to monitor the stress and temperature of the cables, in addition to displacement and strain. Data shows that changes in cable temperature lag behind ambient air temperature. Stresses of longest cables are linearly related to temperature. However, the stresses of the shortest cables near the pylon were affected by combination of both temperature and other factors. Small change in average cable stresses before and after typhoon indicates a stable performance of the entire structural system.

Keywords: structural health monitoring, cable stayed bridge, cable stress

INTRODUCTION

Many studies have proven Structural Health Monitoring (SHM) system to be effective, such as frequency recognizing [1] and strain analysis [2]. Despite these studies and the increasing commonality of SHM systems, there are few systems accommodated cables into real-time monitoring. However, staid cables provide major support to the structure system of cable stayed bridges. There is a need to use current up-to-date equipment to measure the service stress of cables continuously as part of structural health evaluation, and to provide appropriate maintenance scheduling. The Zhanjiang Bay Bridge is a cable-stayed bridge with a main span of 480m. Upon its completion in December 2006, a Bridge Health Monitoring System was installed to verify its structural properties, and to monitor its behavior under service and extreme conditions such as typhoon [3]. In addition to sensors to monitor structural displacements and strains, Electro-Magnetic (EM) [4] sensors were used to monitor the stress and temperature of the cables directly. This paper intended to analyze the structural behavior using data collected by EM sensors.

1196

Код: 10723

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Издательство DEStech Publications, Lancaster, 2010 год

6 стр; формат: 23,5 x 16 см; библиографический список: 4 единицы
ISBN: 978-1-60595-024-2

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Ключевые слова:

Содержание.