



# One Year Operational Strain Monitoring of Shanghai Yangtze River Main Navigation Channel Bridge to Normal Traffic

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## Summary

This paper presents operational strain monitoring results of the main navigation channel cable-stayed bridge of Shanghai Yangtze River Bridge in normal traffic condition. The strain records of the hot spots in 10 critical cross sections of the bridge are collected and then analyzed. The strains due to environmental effects (wind and temperature) and operational vehicles are separated. The strain influence lines of the bridge under moving vehicles are then extracted and compared with the computed influence line from a baseline numerical model for model calibration. The statistical characteristics of the bridge strain influence lines are then analyzed, summarized by month, and presented in this paper.

**Keywords:** strain; safety; monitoring; fatigue; cable stayed bridge.

## 1. Introduction

For structural ultimate and fatigue performance monitoring, the key task is to extract meaningful structural load effect information not only after the erection for the intact structure but also during the whole servicing life for the deteriorated structure. The strain monitoring measurements at the hot spots of structure are one class of important monitoring records for this purpose [1, 2]. The main issue is to separate the strain records due to dead load, environmental load (wind and temperature), and live operational vehicle load and then find their statistical characteristics.

In this paper, the operational strain monitoring results of Shanghai Yangtze River Main Navigation Channel Cable-Stayed Bridge in normal traffic conditions are presented. The strain records of the hot spots of critical cross sections of the bridge are collected and analyzed. The strain due to temperature effects and operational vehicle are separated. The strain influence lines of the bridge under moving vehicles are then extracted and compared with the computed influence line from a baseline numerical model for a calibration. The statistical characteristics of the bridge strain influence lines are then analyzed, summarized by month, and presented in this paper.

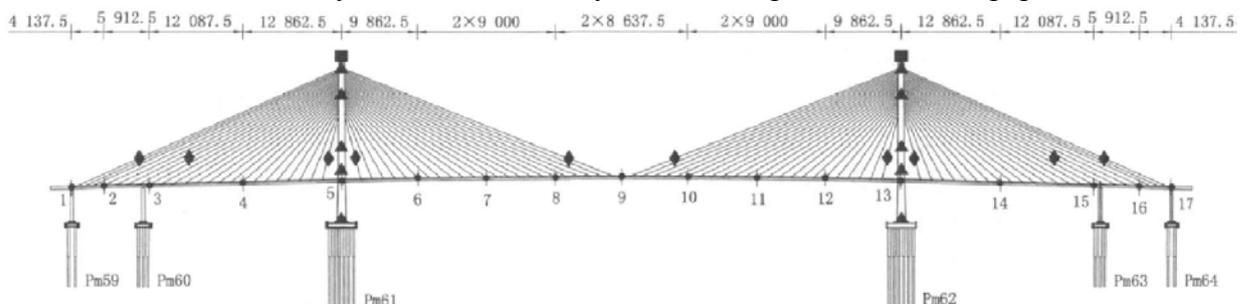


Fig. 1: The monitored cross sections and stay cables of the bridge (unit: cm.)  
Note: the numbers under the main girder are the cross section number.

## 2. The bridge and the monitoring system

The main navigation channel bridge of the Shanghai Yangtze River Bridge is a double pylon double