Nondestructive Load Testing of a Single-Span, Cable-Stayed Bridge: Testing Design, Instrumentation and Preliminary Results

Vassilis GIKAS, Phaedon KARYDAKIS, Thanassis MPIMIS, George PINIOTIS and Harris PERAKIS, Greece

Key words: bridge monitoring, precise leveling, digital inclinometer, microwave interferometry, digital image correlation, FEM

SUMMARY

This paper presents the testing design, the instrumentation and preliminary results derived from a full-scale load test undertaken at a single-span, cable-stayed bridge using variant monitoring techniques. The primary objective of the project is to assess the level of structural integrity of the bridge based on systematic comparisons between analytical models and the parameters derived from the monitoring data for a multitude of specifically designed static and dynamic load tests. Also, a key objective of this work is to build a database of high capacity, multi-sensor bridge monitoring data to assist in research related to optimal sensor placement and sensor integration for bridge performance assessment. The deformation monitoring scheme consists of four independent systems used to provide complementary displacement data for the deck, the cables and the pylons. Deck monitoring is accomplished using a combination of ground-based microwave interferometry (GBMI), digital image correlation (DIC), digital inclinometers and precise leveling, whereas GBMI and DIC are used to track cable and pylon movements respectively. Currently, the field tests are underway, whereas data pre-analysis follows a stepwise and event-based process with preliminary results outlined in this article.