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Editorial

This issue of *Bridge Structures* contains four papers that will be presented at the 5th International Cable-Supported Bridge Operators' Conference to be held in New York City on 28 – 29 August 2006. The papers deal with issues of cable deterioration, fatigue and vibration problems, and service life concerns for cable-supported bridges. The issue leads off with a paper by Gjerding-Smith *et al.* on "Wire fractures in locked coil cables". The authors discuss wire fractures in the main cables of the Lysefjord Suspension Bridge, which is located on the western coast of Norway, roughly 25 km east of the City of Stavanger, and crosses Lysefjord with a main span of 446 m. Since its completion in 1997 more than 900 wire fractures were identified in the outer layer of the main cables. Uncertainties related to wire fractures in sub-layers, reduction of load-carrying capacity and lifetime, and future development of wire fractures, have prompted extensive investigations of the main cables. Failure analyses of fractured Z-wire samples and fracture analysis concluded that cracks have initiated and propagated from surface imperfections. The potential for generation of hydrogen atoms and absorption that cause hydrogen-induced cracking are discussed. In their conclusions, the authors present evaluation of the remaining load-carrying capacity, need for strengthening of the main cables and methods for monitoring of wire fractures.

In January 2004, one of the lower hanger plates of the First Bosporus Suspension Bridge in Istanbul, Turkey, fractured. Emergency repairs were performed on some of the plates. The Turkish Highway General Directorate (KGM) was concerned about the fatigue performance and potential for cracking of the remaining hanger plates. A bridge evaluation project was initiated to establish the root cause of the problem and to devise appropriate solutions. In "A monumental bridge with a problem caused by oversights in design", Mehrabi summarizes the evaluation process and its results. The scope included short- and long-term hanger force and plate strain measurements, finite element analysis, non-destructive testing, probabilistic analysis, and remaining service life estimation. The investigation showed unusual behavior of the bridge superstructure that is attributed to the inclined configuration of the hanger cables introducing additional stiffness and attracting additional forces from a variety of sources. The author concludes that many of the hanger plates are at the critical stage of their service life.

The Dubrovnik Bridge, an asymmetric cable-stayed structure, was opened for traffic in 2002. The bridge is located across the Dubrovacka River, on the western entrance to Dubrovnik, a historical medieval town in Croatia. Amplitudes of stay vibrations under the combination of light rain and moderate wind speeds are comparable to those measured on other bridges and no notable difference between the expected and actual behavior has been established. In "Cable vibrations at Dubrovnik bridge", Savor *et al.* present the results of wind tunnel tests, various numerical analyses, and field observations of stay vibrations.

Since 1970, truck travel in the Unites States, as measured in vehicle miles of travel (VMT), has increased by 216%, whereas the population has increased by only 33%, and overall vehicle travel (total VMT) has increased by 137%. On the other hand, service life presents a nebulous consideration in the planning of suspension bridge rehabilitation projects. In "A conceptual model of bridge service life", Chang and Garvin present a model that defines the bridge service life as a function of physical and non-physical factors. The authors define the latter as changing traffic loads and alternate levels of evaluation. The paper finally concludes with a discussion on the implications that the proposed model has for network level studies concerning the impact of truck weight reform on bridge service life.

Each of these papers is of considerable impact and presents a significant contribution to the *state-of-the-art* in the field of cable-supported bridges.

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