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Editorial

At its opening on June 10, 2000, the London Millennium Footbridge demonstrated excessive lateral vibration. This highlighted the importance of lateral pedestrian-induced vibration that was not considered in the design. Ever since, there have been significant efforts to incorporate the effect of lateral pedestrian-induced loading in the design codes. In their paper, Gaawan and El-Robaa study "Pedestrian bridges structure; assessment of comfort and impact of human-induced vibration." The authors focus on evaluating the footbridge behaviour consisting of two composite steel beams. The footfall analysis is carried out by Robot Structural Analysis software. The use of high-performance concrete in bridges is now widely spread. However, the use of such high-performance material with high compressive strengths allows design engineers to exceed the range of applicability of current design code provisions. In "Evaluation of live-load distribution factors for high-performance pre-stressed concrete girder bridges," Dwairi et al. study the results of load testing of an instrumented girder bridge constructed using high-performance, high-strength concrete, under controlled-load condition. The paper compare AASHTO LRFD distribution factors to the factors computed from girders measured strains. A significant portion of United States transportation infrastructure was constructed in the middle third of the 20^{th} century and is deteriorating with age. According to the Federal Highway Administration, the total annual km traveled increased from 4,225 billion in 1998 to 5,190 billion in 2018. As the traffic volume trend continues to increase, the number of bridges in need of maintenance, rehabilitation or replacement has also increased. In "Evaluation and rating of older non-composite steel girder bridges using field live load testing and nonlinear finite element analysis," Albraheemi et al. focus on evaluation and analysis of simple span, steel girder bridges commonly built between 1930 and 1960. These bridges are characterized by closely spaced girders, thick concrete decks designed as non-composite with the girders, and stocky girders with thick webs. In the last 20 years, Global Positioning Systems (GPS) and in general GNSS (Global Navigation Satellite Systems) have been used for the monitoring of deflections of cable-stayed bridges; a topic of major interest especially due to the excessive lateral deflections of the London Millennium Footbridge in London at its opening on June 10, 2000. Apart from GPS, other geodetic sensors such as robotic theodolites (Robotic Total Stations, RTS, known also as Total Positioning Systems, TPS) have been used to measure stiffer bridges. Currently, probably more than 100 bridges in all parts of the world have been monitored using geodetic techniques, some in specific conditions (for example during the New York City Marathon), and some in the framework of permanent monitoring systems. Stiros et al. deploy "Multi-sensor measurement of dynamic deflections and structural health monitoring of flexible and stiff bridges," on several types of bridges in Greece. Bridge structures in seismically active regions must generally maintain some level of functionality despite being subjected to accelerations that arise during seismic events. The need to remain functional following seismic events especially pertains to bridges, which are common along evacuation and emergency access routes. Accordingly, bridge design specifications in the US include provisions for seismic loading, and contain delineations of the required complexity of analysis methods based on bridge structural configuration and site seismicity. In the US, bridges classified as critical and irregular (in select seismic zones) are required to be designed for seismic loadings using time-history analysis. To promote use of time-history analysis in designs across wider ranges of bridge configurations and seismic site classifications, design-oriented tools are being developed. In "Comparative study of spatially and non-spatially varying ground motions in design-oriented seismic analysis of bridges," Botero et al. use a multiple-support excitation algorithm, in conjunction with the beam on nonlinear Winkler foundation model to compare piled substructure responses from an in-service integral abutment bridge, which was subjected to a parametric set of ground motions. Empirical expressions for estimating live load bending moments are typically specified in AASHTO bridge codes. In their paper, “Reliability of AASHTO LRFD parameters in multilane reinforced concrete slab bridges,” Mahmood et al. evaluate the reliability levels that are inherent in the simplified empirical equations in the AASHTO LRFD to design concrete slab bridges. The authors model typical one-span, multilane, straight bridges, with various span lengths, using finite element analysis (FEA) and subjected to AASHTO live loads. FEA results are compared with LRFD moments to quantify biases that might result from the simplifying assumptions in AASHTO. The reliability index β for bridge cases using AASHTO procedures and FEA results were quantified. Fatigue assessments of novel structural components that are not explicitly addressed in the existing bridge design codes require the application of the local fatigue assessment methods. In “Fatigue assessment of the gusset-less connection using field data and numerical model,” Mashayekhi and Santini-Bell present fatigue assessment of the novel gusset-less connection of a vertical lift truss bridge, the Memorial Bridge, in Portsmouth, New Hampshire, USA. The long-term structural health monitoring responses are collected from the instrumented gusset-less connection at the Memorial Bridge to determine the nominal fatigue response using the collected strain responses. In addition, a global multi-scale finite element model of the bridge is created to effectively model the structural components of the bridge. A local sub-structure finite element model of the connection is created to determine the stress concentration factors that are applied for the hot-spot fatigue assessment method. The acquired stress concentration factors under the static and dynamic load test are applied for hot-spot fatigue assessment of the gusset-less connection.

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