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Editorial

This issue of *Bridge Structures* leads off with a paper by Nakamura et al. on "Corrosion resistance of steel bridge wires coated with Aluminium-Zinc alloy." The authors propose to coat bridge cable wires with Aluminium-Zinc alloy rather than Zinc alone. The paper describes the accelerated corrosion tests performed on two groups of high strength steel wires; one coated with Aluminium-Zinc alloy and the other only with Zinc, under different levels of relative humidity. The authors conclude that wires coated with Aluminium-Zinc have higher corrosion resistance than the conventional Zinc coated wires. Many investigations of failed structures have determined that fatigue was the cause of the failure. Thermal cyclic loading occurs from the daily and seasonal changes in the temperature. The practice and procedures undertaken to reduce the number of failures due to fatigue is the inspection of the structure on a regular basis. For pile foundations, inspection is not an effective option due to lack of accessibility. In "Performance of piles in integral abutment bridges under thermo-mechanical cyclic loads," Razmi et al. present an analytical procedure that can be used to determine the fatigue life of a pile. The method was used to analyze a pile in an integral abutment bridge subjected to thermo-mechanical loading due to daily and seasonal temperature changes. The fatigue life of the pile was determined for different bridge lengths. The procedure presented can thus be used in the investigation of failure or performance problems of structural elements that cannot be inspected visually. Concrete bridge decks are designed using traditional methodology (TM) or empirical methodology (EM). TM models the deck as a continuous beam in flexure, and EM recognizes the compressive membrane action that aids in distributing wheel loads. An extension of membrane behavior is complete removal of reinforcement from within the deck; this is referred to as steel free deck (SF). In "Investigation of alternative technologies for cast-in-place concrete bridge decks," Yost et al. study three full-scale bridge decks, one reinforced with steel, a second is reinforced with glass fiber reinforced polymer (GFRP), and a third is SF. For each, the steel and GFRP reinforced decks, the south and north sides are reinforced as required by the TM and EM, respectively. Each deck is subjected to four load cases, corresponding to an AASHTO truck axle positioned for critical positive and critical negative bending on each the north and south sides. Measured response for crack width, deflection, and concrete strain is used to evaluate behavior at the service limit state. Finally, in "Deflection of ultra-high performance concrete slabs and hybrid FRP composite girders considering partial shear interaction" Zatar et al. experimentally investigate flexural behavior of composite girders consisting of hybrid fiber reinforced polymer (HFRP) I-girders and ultra-high performance concrete (UHPC) slabs. The HFRP I-girders consisting of layers of carbon fiber reinforced polymer (CFRP) and glass fiber reinforced polymer (GFRP) are employed in the experimental investigation. The composite girders are tested under four-point loading scheme. The results showed that the composite girders could provide a very competitive and sustainable solution to accelerated bridge construction. The authors carry out a three-dimensional nonlinear finite element (FE) analysis of simply supported HFRP-UHPC composite girders. Nonlinear load-slip relationship for the shear connectors is considered in the FE analysis. Comparisons between the experimental and FE analyses were performed and the authors report a fairly good agreement.

Vehicular accidents involving tanker trucks may initiate devastating fires that can cripple a steel plate girder bridge. In "High temperatures and bridges: transverse stiffeners in steel girder fire performance", Glassman and Garlock study the contribution of the transverse stiffeners to postbuckling shear capacity with a focuses on the effects of utilizing diagonal orientations of the stiffeners and providing thermal insulation for the stiffeners alone. The authors report that the diagonal stiffener models do not offer much improvement to the postbuckling shear strength compared to the use of the traditional vertical intermediate stiffener. The paper concludes that providing fire resistance solely for the stiffeners was found to offer a minimal increase in the postbuckling shear strength at elevated temperatures.

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