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Editorial

Out-of-plane buckling behavior is one of the determining factors in the design of steel-tied arch bridges. While considerable research focused on the determination of the geometrical imperfections, the influence of residual welding stresses has not been studied in depth. In “Finite element modeling of the influence of residual weld stresses on buckling”, Outtier and De Backer conclude that the influence on the buckling behavior is very small. Electroslag welding is used mainly to join low carbon steel plates and/or sections that are very thick in a vertical or close to vertical position. The Federal Highway Administration (FHWA) found that electroslag welding, because of the very large amounts of confined heat used, produced a coarse-grained and brittle weld and in 1977 banned the use of the process for many applications. The FHWA commissioned research from universities and industry and Narrow Gap Improved Electro Slag Welding (NGI-ESW) was developed as a replacement. The FHWA moratorium was rescinded in 2000. The latest version of electroslag welding, ESW-NG (the NG stands for narrow gap – about ¾ inch), is currently accepted by AASHTO for welding common types of bridge steels and is included in the bridge welding code (AWS D1.5 2015). In “Phased array ultrasonic testing (PAUT) performed on electroslag weld specimen subject to cyclical tension load testing”, Wahbeh et al. report on mechanical testing of a large tensile coupon under a cyclical plastic tension loading regime until failure and provide the test data in order to gain insight into the ESW-NG welding process. One of the key parameters in determining the structural response of a footbridge is the frequency of the bridge. In “Interaction Between Pedestrian Loading and Vibration Response of a Laboratory-Scale FRP Composite Footbridge”, Archbold & B. Mullarney provide details of the ongoing material testing, design and construction of a laboratory-scale FRP composite footbridge. The bridge was constructed from glass fibre reinforced polymer (GFRP) composite planks, with GFRP lateral bracing. This structure supports a timber deck. The bridge is lightweight and the span can be altered from 6.5 m to 8.0 m clear span to adjust the structural response, by altering the natural frequency and magnitudes of displacements. The bridge can also be fixed in position through the use of removable intermediate supports. The bridge also has a force plate mounted at mid-span, facilitating direct measurement of the reaction force between the pedestrian and the structure. Vandalism, human errors or severe accidents could result in significant fire events on and beneath bridges. The resulting damages often require a reconstruction of the bridge superstructure or, in case of a complete collapse, of the whole bridge. In “Effects of extreme fire scenarios on bridge”, Kaundinya et al. report on the systematic findings regarding the consequences of extreme fire events beneath and on top of bridges. The examined scenarios include solid and liquid fires, which were investigated with Computational Fluid Dynamics (CFD) calculations. In order to validate the CFD models used, an original-scale bridge fire test was conducted, using a fire scenario with a truck loaded with wooden pallets. In order to answer the question which bridge structures are the most vulnerable to extreme fire events and have to be protected in the future, especially civil engineering aspects should be taken into account with due consideration given to bridge geometry, clearance, material and structure.

Khaled M. Mahmoud, PhD, PE
Editor-in-Chief
BTC
New York, NY, USA.