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Editorial

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Editorial

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High-speed railway (HSR) lines are considered to be sustainable public transport systems and have seen a rapid and increasing development worldwide in recent years. In this issue of *Bridge Engineering*, we are pleased to focus our attention on the theme of HSR bridges, publishing seven papers that present some interesting recent research findings and studies of bridges in practice from around the world.

The issue starts with a paper presenting the current state-of-the-art on modelling HSR bridges under traffic loading, authored by Pring and Ruiz-Teran (2020), in which different approaches are compiled and compared. An informative introduction to HSR is followed by sections focusing on bridges, vehicles, tracks, track–vehicle interaction, irregularities and, finally, HSR bridge design constraints.

The second paper by Pugasap (2020) discusses the results from a parametric study consisting of 36 numerical models representing a multi-span viaduct, focusing the analyses on four key parameters: the pier height, the span length, the bearing plan layout and the depth-to-span ratio. All models are dimensioned according to typical HSR structures in California, USA. The findings show that the large dynamic displacements induced at the top of the substructures when amplified by resonance effects could cause out-of-phase motions of adjacent girders and induce relative displacements and rotations between two consecutive decks, which could exceed the design limits.

The third paper by Rademacher and Tilley (2020) presents the historical development, structural details, materials, transportation and construction, and special applications of filler beam bridges. In addition, new design tables are provided for single-track, single-span, filler beam bridges in the span range of 5 to 35 m for the German HSR network operating at speeds of up to 350 km/h. This paper offers a comprehensive review of this special form of HSR bridge.

Torralba *et al.* (2020) explain the design criteria used for nine medium-span (from 37 to 70 m) continuous HSR viaducts with box-girder decks, constructed in Spain. In this fourth paper, the reader will find an interesting description of an innovative construction process using movable scaffolding spanning shorter lengths than those between piers. It also

includes a comparison between different post-tensioning and reinforcing steel ratios in terms of fatigue design.

The first four papers focus on small to medium HSR bridges, with spans of up to around 80 m. The fifth and sixth papers in this issue look at two large bridges with significantly longer spans that have been constructed within China's HSR network.

Li *et al.* (2020) present the Jinsha River Bridge, with a main span of 336 m, located on the Chengdu–Guiyang HSR line. This rare double-deck structure combines a set of arches supporting the heavy loading of four rail tracks on the upper deck and a six-lane road on the lower deck. This brought significant challenges for the design and construction of this unusual, complex, landmark bridge built in a mountainous region in China.

Yi *et al.* (2020) present the third Wuhu Yangtze River Bridge, located on the Shangqiu–Hangzhou HSR line; a 588 m span cable-stayed bridge with two decks supporting an eight-lane road (above) and four rail tracks (below). The bridge features an asymmetrical low pylon. Innovative measures were taken to overcome the challenges of low stiffness and unfavourable axial forces induced by the low pylon, and the use of a strong box and weak truss composite girder.

To close out this themed edition, we include the paper by Ahmadi *et al.* (2020), which looks at the current research on Hyperloop train systems. Although this does not fall into the rail category, Hyperloop systems may represent the future of ultra-high-speed transport systems. This paper investigates the lateral vibration of Hyperloop train–bridge–pier systems through numerical studies. It is found that the lateral dynamic amplification factors of the system are highly dependent on the train speed, the train-to-bridge mass ratio, the train loading spacing and the pier-to-deck stiffness ratio.

We hope that you find these papers interesting to read. HSR bridges have many aspects to be considered and we encourage the entire readership to share their experiences by submitting an article to *Bridge Engineering*. Furthermore, to continue with the HSR theme, the Editorial Panel is planning an issue on High Speed 2 between London, Manchester and Leeds (UK).

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