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Editorial

The Statics, Dynamics, and Aerodynamics of Long-Span Bridges

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Humans have historically built various kinds of bridges, including girder, arch, cable-stayed, and suspension bridges, in order to cross streams, rivers, and valleys. Although the bridges that were built in ancient times were small and primitive, they were bridges nonetheless. China's history is one of the longest in the world, going back about 5000 years. The Chinese have built thousands of bridges that form an important part of China's culture. For example, the Zhaozhou Bridge, which is a stone arch bridge, served for more than 1400 years and is still in use, and the iron chain suspension bridges created by the ancient Chinese remain a vivid symbol in the world's history of bridge development.

The bridges built today are certainly longer and more sophisticated than those in ancient times, and have a greater capacity for bridging the distance between two sides of an expanse. In the 1980s, given the steady, rapid growth of China's economy, a golden era in bridge engineering was triggered in China, particularly in the construction of various long-span bridges. As of the end of 2017, China has built more than half of the 10 longest span girder, arch, cable-stayed, and suspension bridges in the world—mostly in the form of arch bridges and high-speed railway bridges. Due to the increase in bridge span, bridge structures are becoming longer, lighter, and more flexible. These changes result not only in static problems, such as cracks and fatigue, but also in dynamic problems, such as deck and cable vibrations, as well as aerodynamic issues related to flutter instability, vortex-induced vibration, stochastic buffeting, and so on. To partly reflect the state of the art in bridge technology, the special issue Bridge Engineering presents a collection of 10 papers covering recent advances and developments in concrete-filled steel tube arch bridges and long-span high-speed railway bridges in China, as well as the statics, dynamics, and aerodynamics of long-span bridges, including concrete, steel, and composite structures, from around the world.

With the support of the Chinese Academy of Engineering, it has been our great honor to invite academicians and renowned researchers from China, Germany, Japan, Korea, Portugal, and the United States to share their new ideas, theories, and technologies regarding the statics, dynamics, and aerodynamics of long-span bridges, while exploring strategies to address future development and challenges. We would like to thank the authors of this special issue for their contributions, as well as the reviewers for their valuable comments on the papers. We sincerely hope that this issue is useful to your research and development on related subjects.

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