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Editorial

Structural Health Monitoring (SHM) of Civil Structures

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As newer and more reliable ways of construction were developed, civilization began to spread out further and retain functional infrastructure for longer periods of time. Key building materials such as concrete ushered in a new era of civil engineering that enabled the rapid and low-cost construction of infrastructure that now serves as the backbone of modern society. Many of such buildings constructed in the 19th to the mid-20th century are still in operation today as a testament to the robustness of the civil structures enabled by the key building materials and methods. However, robustness has its limits, and the extended service life has inevitably led to the dangerous accumulation of damage in the infrastructure. Aging infrastructure is a problem met around the globe, and in the US, the National Academy of Engineering proclaimed the restoration and improvement of urban infrastructure to be one of the Grand Challenges of the 21st century.

For the answer to the challenge of aging infrastructure, we look towards the development of advanced sensor and actuator technologies that hold the promise of heralding the next stage of evolution in civil infrastructure. Popular terms such as Internet of Things and smart structures were coined as a result of the intersection between advances in other engineering disciplines with civil engineering to produce the new field of structural health monitoring (SHM). The field of SHM is now at a vital crossroads, where researchers are challenged to develop technologies for the monitoring and retrofit of older buildings and at the same time to push the boundaries of SHM through the creative use of cutting-edge technologies and data processing algorithms.

This issue is a snapshot of the newest research in SHM for civil structures, and it includes a range of topics such as data processing algorithms to detect damage, modeling, and simulation [1–15]; sensor development and experiments [16–26]; materials studies [27,28]; state-of-the-art reviews [29,30]; and case studies [31]. SHM is highly multi-disciplinary, and advances in other areas of study can likely be recruited for the progress of SHM. The future of this field is very bright, and will be a driver for the coming futuristic, intelligent infrastructure.

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