Preface

This proceeding is a collection of papers presented at the 2nd International Workshop on Structural Health Monitoring for railway system (IWSHM-RS 2018) on October 17th-119th, 2018. Due to space limitation, 93 papers were selected and included in the Workshop proceedings with applications expanding from manufacturing, sustainability, design, intelligent structure, sensor and actuator, sensor network and system integration, multi-function materials and structures, signal processing, detection and diagnosis, prognostics, health management and condition-based maintenance, modeling, simulations and SHM-based design, implementation, validation and certification, SHM "big data" analytics and services, Standard for SHM engineering application

Due to recent significant advancements in sensor technologies as well as "big data" sciences, Structural Health Monitoring Technology (SHM) has been recognized as the key technology for providing cost-effective real-time safety assurance and operation efficiency of structural platforms across multiple industries. The Workshop will assess and evaluate state-of-the-art SHM technologies that are particularly applicable for railway applications, especially more mature sensor network based techniques, and discuss and identify key emerging technical breakthroughs and challenges. Roadmaps for implementation and international standardization of SHM technology for railway industry will be particularly emphasized.

Therefore, the theme of the 2nd International Workshop on Structural Health Monitoring for railway system is **"Real-time safety assurance and life-time operation efficiency"**. This proceeding provides answers to those challenges and opportunities. The focus of IWSHM-RS 2018 can be categorized into the following topics:

- **Applications: Manufacturing/Sustainability/Design/Intelligent Structures**

—Rolling stock: high-speed train, urban transit vehicles, freight wagons, etc.

—Civil infrastructure: high-speed railway, freight railway, urban railway and subway railway, etc.

- **Sensors/Actuators**

—Novel sensors, sensor networks, sensors for extreme environments, fiber optics, piezoelectric, magneto-electric sensors, CNT sensors, micro/nano-sensors, etc.

- **Sensor Networks/System Integration**

—Bio-inspired sensor networks, remote and wireless communication, self-diagnostic networks, self-repairing and fault-tolerance networks, advanced manufacturing for structures with built-in sensors, hardware/software integration, durability/reliability of sensors and sensor network systems, etc.

- **Multifunctional Materials and Structures**

—Self-sensing materials, energy harvesting and storage, structures with state awareness

- **Signal Processing/Monitoring/ Diagnostics**

—Advanced signal processing, statistical signal processing, data mining, decision fusion, data-driven approaches such as CNN (Convolution Neural Net), RNN (Reinforced Neural Net), Generative Adversarial network (GAN), AI- compensation methods, etc.

- **Prognostics/Health Management/Condition-based Maintenance+**

—Quality control manufacturing, life prediction, integrated structural health management, SHM-based condition assessment of critical structures, etc.

- **Modeling/ Simulations/ SHM-based Design+**

—Global-local analyses, modeling of sensor/structural responses, manufacturing with sensor data, multi-objective design optimization, SHM-based design, etc.

- **Implementation/ Validation/ Certification**

—Quantification techniques, probability of detection (POD), reliability methods, validation/certification processes, etc.

- **SHM "big data" analytics and services**
- **Standard for SHM Engineering application**

This workshop is co-hosted by China Railway Society, CRRC Co., Ltd. and co-organized by CRRC Qingdao Sifang Co., Ltd., Stanford University, CRRC Industrial Institute Co., Ltd. and National Engineering Research Center for High-Speed EMU.

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