

Special Issue on **Machine Learning and Evolutionary Computation for the Design Optimization of Structural Vibration Control Systems**

CALL FOR PAPERS

Structural vibration control is important for securing the safety of structures in the face of unexpected shock and vibration. The structural control system aims to suppress and control any excessive vibration induced by shocks from earthquakes and strong winds that could potentially affect the behavior of the structure. Although various aspects of vibration control systems have been researched so far, further issues relating to their practical implementation remain to be explored. These include the complexity of its mathematical representation, the time-varying nature of structural conditions due to temperature changes and the aging effect, large-scale global optimization with high dimensionality in design space and the complexity of nonlinear objective functions with large numbers of local minima.

Evolutionary algorithms which imitate the learning ability of the natural world have recently made remarkable progress in terms of dimensionality reduction, the integration of optimization and decision-making based on design preferences, and creating hybrid algorithms of multiple optimization techniques such as genetic algorithms, particle swarm optimization, and harmony search algorithms. Therefore, the application of the latest evolutionary algorithms to structural vibration control systems is expected to provide significant improvements when combating large-scale complex optimization problems.

In addition, recent advances in artificial intelligence, particularly machine learning, have made it possible to implement complex learning models that were previously impossible to represent mathematically. The data-driven learning feature of machine learning provides control systems with the autonomy to be self-tuned and more adaptable to uncertain natural environments. Hence, machine learning is expected to provide promising solutions in the field of structural vibration control, although its applications are yet to be diversified.

This special issue therefore aims to collect original research articles and review articles that discuss the application of machine learning and/or evolutionary computation in relation to the design optimization of structural vibration control systems. Research that showcases new theoretical results as well as numerical and experimental applications of existing theories is welcome.

Potential topics include but are not limited to the following:

- ▶ Application of machine learning techniques to structural vibration control systems
- ▶ Application of evolutionary algorithms or meta-heuristic algorithms to structural vibration control systems
- ▶ Application of hybrid optimization techniques to structural vibration control systems, such as genetic algorithms, particle swarm optimization, and harmony search algorithms
- ▶ Integration of machine learning and evolutionary algorithms to improve the vibration performance of structural control systems
- ▶ Multiobjective based evolutionary computation for the design optimization of structural control systems
- ▶ Robust or adaptive performance evaluation of artificial intelligence-based vibration control systems

Authors can submit their manuscripts through the Manuscript Tracking System at <https://mts.hindawi.com/submit/journals/sv/mlecd/>.

Papers are published upon acceptance, regardless of the Special Issue publication date.

Lead Guest Editor

Seung-Yong Ok, Hankyong National University, Anseong, Republic of Korea
syok@hknu.ac.kr

Guest Editors

Kwan-Soon Park, Dongguk University, Seoul, Republic of Korea
kpark@dongguk.edu

Wonsuk Park, Mokpo National University, Muan-gun, Republic of Korea
wonsuk@mokpo.ac.kr

Yunbyeong Chae, Old Dominion University, Norfolk, USA
ychae@odu.edu

Submission Deadline

Friday, 3 January 2020

Publication Date

May 2020