Special Issue

Artificial Intelligence in Building Structural Performance and Safety

Message from the Guest Editors

Recent advances in artificial intelligence—spanning machine learning, deep learning, physics-informed modeling, and probabilistic inference—are reshaping how building structures are designed, analyzed, monitored, and safeguarded across their life cycle. This Special Issue, “Artificial Intelligence in Building Structural Performance and Safety,” invites high-quality research and reviews that leverage AI to accelerate structural computation and design, enable data-driven and hybrid modeling, and deliver reliable monitoring, diagnosis, and decision support for safety-critical applications. Topics include AI-accelerated simulation and optimization; inverse problems for parameter identification and model updating; structural health monitoring and damage detection with multi-source sensing; digital twins and real-time safety assessment; uncertainty quantification, reliability analysis, and risk-informed decision-making; predictive maintenance and life-cycle performance; resilience to extreme events and multi-hazard scenarios; and explainable, trustworthy AI for code compliance and engineering practice. Special Issue
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About the Journal

Message from the Editor-in-Chief

Current urban environments are home to multi-modal transit systems, extensive energy grids, a building stock, and integrated services. Sprawling neighborhoods are composed of buildings that accommodate living and working quarters. However, it is expected that the cities and communities of the future will face complex and enormous challenges, including maintenance, interconnectivity, resilience, energy efficiency, and sustainability issues, to name but a few. A smart city uses advanced technologies and a digital infrastructure to improve the outcomes in every aspect of a city's operations. A smart building optimizes the experience of occupants, staff, and management by using a modern and connected environment. Innovations in technology that can bring dramatic improvements to design, planning, and policy are critical in developing the cities and buildings of the future.

Editor-in-Chief

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