

# Special Issue on “Advanced Computational Methods and Smart Technologies in Structural Engineering and Seismic Design”

## Preface

Recent advances in computational methods, artificial intelligence, and structural engineering have revolutionized our approach to designing, monitoring, and analyzing civil engineering structures. This special issue presents six cutting-edge research papers that showcase innovative methodologies in structural engineering, with particular emphasis on seismic design, health monitoring, and smart computational approaches.

The collection begins with Yu *et al.*'s novel approach to seismic design using gradient functions, offering new perspectives on high-performance structural systems. Dr. Li's work is complemented by research investigating the rate-dependent properties of materials and their influence on seismic motion in bridges, providing valuable insights into dynamic structural behavior. Zou *et al.* proposed a newly hybrid connection prefabricated assembled bridge pier with socket connection and prestressed reinforcement connection. The issue features groundbreaking work by Wang *et al.* on rotational deformation amplification friction self-centering braces, representing an important advancement in structural control systems. Wu *et al.* contribute significantly to the field with their machine learning-based methodologies for probabilistic prediction of random seismic frame structural responses, demonstrating the growing importance of artificial intelligence in structural engineering. A comprehensive state-of-the-art review by Zhou *et al.* explores physics-guided neural networks for bridge health monitoring, offering valuable insights into the integration of physical principles with artificial intelligence for structural assessment. This work particularly highlights the emergence of digital twin technology and its applications in civil engineering.

These papers collectively represent the cutting edge of structural engineering research, combining traditional engineering principles with modern computational methods and smart technologies. The findings presented here will be of particular interest to researchers, practitioners, and engineers working in structural design, seismic engineering, and infrastructure health monitoring.

The advances presented in this special issue demonstrate the evolving landscape of structural engineering, where computational intelligence meets practical engineering challenges, paving the way for more resilient and intelligent infrastructure systems.

### Guest Editors

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