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COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING WILEY

INTRODUCTION

Introduction

Since the 1990s, artificial intelligence-based methodologies including machine learning and deep learning methods have emerged with a paradigm shift from a knowledge-driven approach to a data-driven approach. These methodologies are also gaining ground in the vibration control of components and structures through data analysis. Along this main vein, research on one- and multi-dimensional vibration control represents a hotspot in structural and earthquake engineering worldwide; it recently produced a wealth of innovative mitigation devices, innovative materials used in these devices and metamaterials/metastructures characterized by repetitive units. As a leading and high-impact international journal, *Computer-Aided Civil and Infrastructure Engineering* (CACAIE) has motivated this new special issue, 38:12(2023), to continue the tradition of *CACAIE* of publishing major original contributions in the specific area of Computational Earthquake Engineering and Vibration Control of Structures. Eight research papers, originating from Austria, China, France, Italy, Korea, Poland, and the United States, are selected for publication in this special issue after two to three rounds of rigorous and anonymous review processes by five to 10 reviewers. In particular, these papers bring new insights on important topics, namely, the application of passive resonant metastructures for vibration control of steel members and small modular reactors in earthquake-prone zones; adoption of non-linear concepts like rocking for the seismic isolation of two-block components or tuned liquid column damper inerters for seismic control of base-isolated structures; and semi-active control based on reinforcement learning, used instead to suppress transient vibration of structures subjected to unknown harmonic excitations; also computational, that is, multi-objective optimization tools, proposed for community building group recovery scheduling and resilience assessment under seismic loading; moreover, given the importance of nonstructural elements in a performance-based earthquake engineering setting, shaking table testing protocols for seismic assessment and qualification of acceleration-sensitive elements. This body of knowledge broadens the research vision in seismic engineering thanks to the adoption of metastructures, nonlinear mechanisms, and machine learning and control and has shown promising results in a wide range of device applications physical testing and control.

We appreciate all submitted papers from many active research groups who shared innovative ideas for this first special issue in Computational Earthquake Engineering and Vibration Control of Structures. Furthermore, we sincerely thank the reviewers for their timely, rigorous, and painstaking reviews. Finally, we acknowledge the devotion of the editor-in-chief, Prof. Hojjat Adeli, in developing this top journal and supporting this special issue. We are honored to organize this issue and continue witnessing the success of *CACAIE*.

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