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Session ID: AIM-4

Title
AI-BASED METHODS FOR THE SEISMIC ANALYSIS, DESIGN, AND EVALUATION OF STRUCTURES AND REGIONS

Convenors
X. Lu [1], H. Burton [2], J. Song [3]

Description
AI and data-driven methods have gained increasing attention in earthquake engineering over the past few years, effectively aiding our understanding of ground motions, geotechnical engineering and the seismic behavior of engineered structures. There is notable ongoing activity regarding this subject such as the forthcoming publication of a special issue on AI and data-driven methods in earthquake engineering in the Journal of Earthquake Engineering and Structural Dynamics (EESD). (EESD is the Official Journal of International Association for Earthquake Engineering). In the special issue (to be published by the summer of 2023), approximately two dozen rigorously peer-reviewed articles will discuss the details of both the potential and challenges associated with AI technology.

This Technical Session is intended to serve as a follow-up to the special issue. The session will present new and more refined AI techniques and approaches in earthquake engineering. Emphasis will also be placed on bridging the existing physics-based approaches with new data-driven ones. To this end, the session will incorporate a discussion on how domain knowledge in structural dynamics and earthquake engineering should be utilized in the relevant AI methods and the generalization of the proposed methods toward the application to real-world earthquake engineering problems.

This Technical Session welcomes contributions with topics related to:
1. AI-based ground motion simulation and analysis;
2. Novel AI methods for geotechnical earthquake engineering;
3. AI-based method for nonlinear structural dynamic analysis;
4. Novel AI methods for seismic risk assessment, quantification of resilience, loss estimation, and lifetime considerations for buildings, other structures, and community systems;
5. Structural seismic design and optimization methods using AI;
6. Novel AI applications to multi-hazard engineering that includes earthquakes and other hazards (wind, tsunami, storm surge, fire, blast, impact, etc.)

Invited Speakers
E. Taciroglu [2], G.G. Deierlein [4], H. Li [5], J. Baker [4], J. Hu [6], J. Li [7], S. Govindjee [8], S. Tesfamariam [9], Y.J. Lee [10], T. Kim [11]

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