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Session ID: SHR-14

Title
SURROGATE MODELING TECHNIQUES AND APPLICATIONS FOR REGIONAL SIMULATIONS

Convenors
G. Deierlein [1], A. Taflanidis [2]

Description
Advancements in computational modeling technologies offer capabilities to simulate earthquakes and their effects on the built environment with unprecedented levels of resolution. However, deploying detailed high-fidelity models in large-scale regional simulations can come with prohibitively high computational requirements. In such cases, surrogate models offer a means of significantly reducing computation demands for large-scale simulations, while preserving the accuracy of detailed models. Surrogate models can range from simpler parametric or response surface models to more sophisticated Gaussian Process models and other methods that employ machine learning techniques. Utilization of established and emerging surrogate modeling techniques is facilitated by software libraries and computational workflows. This session will explore the use and development of surrogate models to simulate the effects of earthquakes, tsunamis, and other related hazards in large-scale regional models, including capabilities available in the quoFEM and EE-UQ applications that have been developed specifically for natural hazards research by NSF-sponsored Computational Modeling and Simulation Center (SimCenter, https://simcenter.designsafe-ci.org/). Papers in the session will range from (1) advancements in the development and application of methods to develop and train surrogate models on data from detailed analyses of earthquake and tsunami hazards, structural response, seismic performance of buildings and infrastructure systems, to (2) use of surrogate models in regional simulations of large building inventories and geographically distributed systems.

Invited Speakers
K. Zhong [3], C. Galasso [4], G. Jia [5], S.-R. Yi [6]

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