"Benchmark Control Problem for Real-Time Hybrid Simulation"

RTHS Benchmark Problem Statement: Benchmark problems have been especially useful in enabling a community of researchers to leap forward on a given topic, distill the lessons learned, and identify the capabilities and limitations of various approaches. A benchmark problem statement for real-time hybrid simulation (RTHS) of a seismically excited building has been developed, and is presented to the community with the aim to advance the field. Although numerous RTHS control algorithms have been examined in recent years with computational simulation, few verifications have been validated in the laboratory or with realistic models that include uncertainty. This RTHS benchmark control problem has been developed to address this gap. It includes realistic models of the physical components, parametric uncertainties, and control constraints. We anticipate that the lessons learned through this benchmark problem will provide a clear basis for evaluating the efficacy of various transfer system control strategies and expose research questions.

Special Issue — Open Call: A special issue of *Mechanical Systems and Signal Processing* has been organized to consider papers that address this RTHS benchmark problem statement for a seismically-excited building. Participants are invited to use the models, codes and framework provided, and should develop effective and robust transfer system tracking controllers and report on their performance. The problem provides a framework to examine: the design of a robust transfer system controller; uncertainties in the hydraulic transfer system, the sensing and control implementation hardware, and the experimental subsystem; and the role of partitioning configuration in the stability and accuracy of an RTHS experiment. The task for each participant is to define, evaluate and report on their proposed transfer system control approaches using the models and elements provided. Such approaches should be assessed for both robustness and performance using the metrics provided, and realistic control constraints are defined based on the actual devices used in the laboratory.

Further information and the associated MATLAB data/models can be downloaded at the
URL: https://github.com/MECHS-RCN/BENCHMARKS
And they will be posted in our MECHS website soon: https://mechs.designsafe-ci.org/

Benchmark Problem Statement Files:
C.E. Silva, D. Gomez, Amin Maghareh, S.J. Dyke, B.F. Spencer Jr.
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Papers submitted to this special issue of *Mechanical Systems and Signal Processing* should be noted as such. Submissions are due to the MSSP website between December 15, 2018 and February 15, 2019 and will follow the normal review process. Publication is expected in November 2019.