

LATEST ADVANCEMENTS AND TRENDS IN MULTI-PHYSICS RESEARCH FOR CIVIL ENGINEERING APPLICATIONS

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ABSTRACT

Understanding the hygrothermal behavior of porous building materials such as concrete, earthen materials and masonry is a crucial matter considering the threats imposed by climate change and its impact on our cultural heritage and built environment [1,2]. Moreover, despite numerous advancements, the influence of temperature and moisture on the mechanical behavior of building components and structures has not been fully well understood yet [3,4,5]. Multi-physics problems in civil engineering constitute complex challenges that require interdisciplinary research and advanced computational and experimental techniques [6]. Understanding the behavior of materials and structures under various physical phenomena is crucial for ensuring the safety, durability, and sustainability of infrastructure systems. Further research in this area will contribute to the advancement of civil engineering and the development of innovative solutions to tackle the challenges faced by the field. Current directions of research include coupled modeling, multiscale analysis, consideration of nonlinear and time-dependent behavior, uncertainty quantification, computational techniques, monitoring methods, and experimental validation.

This mini-symposium will cover a range of topics related to multi-physics research on porous building materials. This includes, but is not limited to, modeling of the microstructure of concrete and other quasi-brittle materials and their mechanical response under different loading conditions, simulation of fluid flow and transport phenomena in porous media, and investigation of the impact of environmental factors on the durability and sustainability of

porous building materials. The session will provide a platform for researchers and practitioners to share their latest findings, discuss challenges and opportunities in the field, and explore new paths for research and collaboration. This mini-symposium is targeted towards researchers, practitioners, and students in civil engineering and related fields. Submissions may encompass theoretical discussions, numerical simulations, and/or experimental studies, all of which are equally encouraged. The session will provide a valuable opportunity for participants to engage with experts in the field, learn about the latest advances in multi-physics research, and contribute to the development of innovative solutions for designing and constructing sustainable civil engineering structures.

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