

## NOVEL NUMERICAL APPROACHES FOR INTEGRATED DISASTER SIMULATION FOR DIGITAL TWIN FROM LIVING SPACES TO URBAN SCALES

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### MINISYMPOSIUM

With the evolution of IoT and AI, digital twins that replicate real-world objects and environments in virtual spaces using data collected from the physical world have gained attention. Particularly for rare events like large earthquakes, leveraging numerical simulations becomes crucial due to scarce actual data, allowing the construction of digital twins to enhance disaster preparedness and mitigation.

To conduct disaster simulations, information on the structures within the targeted city is necessary. In recent years, many cities have been actively developing data for 3D urban models, and simplified urban simulations utilizing this data have been performed. On the other hand, efforts have been made to manage detailed information for individual structures using BIM/CIM which can be utilized to create detailed models.

The information required for disaster preparedness and mitigation efforts varies depending on the stakeholders involved. From the administrative perspective, there is a high demand for regional-level damage prediction information. From the residents' standpoint, detailed predicted information on individual buildings is considered crucial. Given the differing levels of detail in obtainable data and the diverse information needs of each stakeholder, the flexible selection of heterogeneous simulations according to the situation is desired. Furthermore, to facilitate information sharing and communication among different stakeholders, an integrated simulation spanning from living spaces to urban scales is needed.

In this mini-symposium we discuss the recent advancements in numerical approaches for integrated disaster simulation, spanning from individual living spaces to urban scales. We welcome topics on numerical modeling using BIM/CIM or 3D urban models, numerical simulations ranging from detailed simulations of buildings, including furniture and non-structural components, to city-scale simulations. Additionally, we are interested in technologies that holistically manage heterogeneous simulations through integration with GIS. We also invite discussions on technologies to reduce computational cost of detailed simulations, such as surrogate models, and methods to assess disaster risk and estimate damages based on numerical simulations.