Abstract for QuakeCore Emerging Researchers Chapter Auckland online lecture

Title: Development of Tools for Seismic Response Analysis of Urban Areas in the Philippines

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In the Philippines, many urban areas are susceptible to strong ground shaking as affected by proximity to fault and site characteristics. Analyzing the seismic response of urban areas is challenging due to the varying structure types and materials used in construction. Moreover, non-engineered structures are widespread and are considered vulnerable to damage. Given these demands, the analysis can be performed by modeling the individual building response as influenced by the seismic hazard and building configuration.

In this presentation, I will discuss the tools which are being developed in-house, and are for use in seismic response analysis of urban areas. These tools target hazard and structure analysis steps, such as, seismic wave propagation from the fault, near-surface wave amplification, and building static and dynamic response. For the building models, we aim for automated model generation using BIM and GIS data, and to discretize using solid or line elements for finite element analysis. Computation cost is addressed by implementing partitioning and parallel computing, and in utilizing the parallel computing environment of the DOST-ASTI CoARE HPC.

As a demonstrative example, the seismic response analysis of several cities in Metro Manila due to scenario earthquake will be presented. The advantages of using the developed tools and current challenges in its applicability will also be discussed.

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