Multi-Hazard Performance of Reinforced Concrete Dry Casks Subjected To Dynamic Mechanical Load

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March 9, 3:00pm-3:30pm, RRI 101

Abstract:

During recent decades, construction industry has been criticized for limited use of innovative methods and slow adoption of cutting edge technologies. However, it seems that a transformation is about to happen and construction industry is getting ready for some revolutionary changes. Employing and scaling up additive manufacturing techniques for automated construction of whole buildings is a novel idea which has been topic of discussion for several years. A review of related projects and research works reveals that Portland cement concrete is the most viable option as the material to be used in automated construction processes in near future. However, the performance requirements for a cementitious “printing mixture” have not been clearly defined.

In this presentation, a framework for performance-based laboratory testing of cementitious mixtures for construction-scale 3D printing (in fresh state) will be discussed, in which workability of a fresh “printing mixture” is described in terms of print quality, shape stability, and printability window. In order to elaborate on the proposed framework and suggested test methods, an experimental program was carried out using four different mixtures. The results of several conventional test methods, as well as proposed tests, will also be presented and performance of different mixtures will be compared. Finally, ongoing research related to real-time quality monitoring of cementitious materials during the concrete 3D printing process will be discussed.

Behavioral form finding using Multi Agent Systems: A methodology for combining generative design with environmental and structural analysis in architectural design

Evangelos Pantazis

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March 9, 3:30pm-4:00pm, RRI 101

Abstract:

Current architectural design models, are in general not capable of the integration of design synthesis formation processes that are directly informed by building performance simulation. In this seminar a behavioral design methodology for finding architectural design alternatives in the early design stage based on the coupling of geometrical parameters with environmental and structural behavior will be presented. The method considers the design to construction process holistically and evaluates designs based on performance targets set by the designer.

A prototypical tool that uses agent based modelling and heuristic search methods has been developed. The objective is to enable architectural designers to explore larger solution spaces and gain deeper insight over complex building design decisions. The methodology is applicable for the early design stage of design problems which traditionally require the close collaboration of architects and engineers such as façade design and shell structures. This proposal introduces a Multi Agent Systems framework and provides a background why such an approach is considered important for managing design complexity in the fields of Architecture, Engineering and Construction (AEC). For the purposes of analysis and validation of our approach, this proposal will present two experimental design where our methodology and developed tool has been applied that vary in complexity