

PH.D. FINAL DEFENSE

**TENSILE RESPONSE OF REINFORCED CONCRETE STRUCTURAL WALLS  
SUBJECTED TO REVERSED CYCLIC LOADING**

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**Abstract**

A barrier to the development, calibration, and validation of improved and quantifiably accurate computational tools for predicting the behavior of concrete structures is the lack of comprehensive and dense test data from more fully realistic experiments. The expression “comprehensive and dense” is being used to describe the collection of full-field strains, deformations, and other test data. The term “fully realistic” refers to test structures being of sufficient size to avoid a significant size effect and being subjected to loading regimes that are representative of what would be expected in real structures.

The advanced research capabilities in the Network for Earthquake Engineering Simulation (NEES) facility at the University of Illinois at Urbana-Champaign make it possible to subject large-scale structural concrete components to fully flexible and complex loading histories and to make comprehensive and dense measurement of their response.

The subject of this thesis is the examination of the behavior and seismic response of reinforced concrete walls. This examination is being made using the results of a series of experiments conducted at the University of Illinois at Urbana-Champaign as part of the Network for Earthquake Engineering Simulation Research Small Group (NEESR-SG) project on the “Seismic Behavior, Analysis and Design of Complex Wall Systems”. A total of eight structural concrete walls, including planar, coupled, and C-Shaped walls, are being subjected to reversed cyclic loading in this project. This thesis is concerned with the tensile response of all portions of the structure considering the effect of load reversals for the first five of these eight tests. More specifically, the test results are being used to assess the influence of structural reinforcement detailing and loading on the development of crack models (average crack spacing and average crack width), and tension stiffening effects. This investigation assesses the appropriateness and limitations of existing models to predict cracking and tension stiffening as needed to develop new models that can be developed using the fairly comprehensive dense data that is being collected from the aforementioned experiments.

**Friday, March 9, 2012**

**3350 Newmark Conference Room (Yeh Center)**

**Public Welcome: 10:00 a.m. - 11:00 a.m.**