AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
STRUCTURAL ENGINEERING DEPARTMENT

BEHAVIOR AND ANALYSIS OF RC COLUMN/MASONRY WALL REINFORCED INTERFACES

A Thesis
Submitted in Partial Fulfillment of the
Requirements for the Degree of

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In
STRUCTURAL ENGINEERING

by

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STATEMENT

This thesis is submitted as partial fulfillment of the requirements for the degree of Master in Civil Engineering (Structures), Faculty of Engineering, Ain Shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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This work is dedicated specially to my parents, to whom I owe so much.

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SUMMARY

The primary objective of this research is to investigate the influence of the interface details between RC column/masonry wall on the response to vertical and lateral loads. The specific tasks include behavior evaluation of RC column/masonry wall different reinforced interfaces under vertical and lateral loads, development and validation of numerical models to simulate the response of the tested specimens, evaluation of untested design configurations using the developed models and finally will include proposal of a set of design guidelines based on the experimental and analytical programs results.

The research program evaluates the structural behavior of different reinforced interfaces between RC column & masonry wall tested under constant monotonically increasing lateral loads with constant vertical load.

Tested Specimens are having different types of RC columns/Masonry wall interfaces, firstly Straight interfaces with variable bed joint reinforcement ratios and toothed interfaces with variable bed joint reinforcement ratios and finally toothed interfaces with variable shear dowels reinforcement ratios.

Test results include the evaluation of the steel strains, top lateral wall displacement, panel distribution and monitoring of crack location and width.

A numerical study is conducted using non-linear finite element models to simulate the behavior of the tested specimens. The models are validated in light of the experimental results. The results

of both phases of the research, experimental and analytical, are used to propose a set of design guidelines for confined masonry walls.

Keywords: Confined Masonry, Straight/Toothed/Reinforced Interfaces and shear failure.

To fulfill the previously mentioned objectives, this research is divided into the following chapters:

- Chapter (1) is an introduction to this study. This chapter discusses the importance of the research and highlights the scope of the research program.
- Chapter (2) presents the currently available theories for prediction of the horizontal behavior of confined masonry wall with different types of RC column/Masonry interfaces.
- Chapter (3) describes the experimental program conducted at the Reinforced Concrete Laboratory of Faculty of Engineering - Ain Shams University for seven masonry walls including two staright interfaces specimens, four toothed interfaces specimens and a single column specimen.
- Chapter (4) describes the experimental results for the seven walls specimens under constant vertical loading and variable lateral loading.
- Chapter (5) presents analyzing the tested walls specimens by simple Strut and tie developed models to simulate linear and non- linear behavior of specimens under constant uniform vertical load and monolithically increasing lateral load.
- Chapter (6) presents the finite element (FE) analysis used to simulate the behavior of the tested masonry walls and a comparison between the results of the FE models and the experimental results was made to verify the FE-analysis. A parametric study was conducted to simulate the response of

untested design configurations and propose set of design guidelines for interface design.

- Chapter (7) introduces conclusions of the study with recommendations for future research and developments in this subject.

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