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Faculty of Engineering
Department of Structural Engineering

Pounding of Buildings with Different Adjacent Floor Levels

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DEDICATION

This work took years from my life. I wish to dedicate it to who suffered to educate, prepare and help me to be as I am,

TO MY MOTHER AND THE SOUL OF MY FATHER

I wish to dedicate my thesis

TO MY BROTHER Dr. NASR EID NASR

for his encouragement and help to complete this work.

Signature:

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Statement

This dissertation is submitted to Ain Shams University for the degree of Master of Science in Civil Engineering (Structural Eng.)

The work included in this thesis was carried out by the author in the Structural Engineering Department, Faculty of Engineering, Ain Shams University, Cairo, Egypt.

No part of this thesis has been submitted for a degree or qualification at any other university or institution.

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Abstract

This thesis concerned with the problem of pounding between adjacent buildings with different floor levels, as it leads to damage of buildings, and sometimes total collapse specially in the case of not taking the collision phenomenon into account during the design, also when the two buildings with different floor levels. The study of this phenomenon is particularly important in Egypt, due to the presence of large areas in Cairo, and other cities, where buildings are erected totally adjacent to each other, without very small, or even no distance between them. This is especially evident in the old city districts, where city regulations allow building on 100% of the land area.

From previous research a finite element 3-D Model for analysis adjacent buildings under pounding **(Moustafa,A.2013)** was modified and extended to include the analysis of buildings with different floor levels. The structural behavior of buildings under the effect of pounding is simulated using 3-D finite element analysis of the buildings, while modeling the case of pounding at several points along each floor level, by introducing special gap elements between the 2 buildings at these points. Time-history analysis of several buildings was performed in 3-D modeling using three different time history, under the effect of actual earthquake records scaled according to the Egyptian code of practice specifications for Cairo area.

An extensive parametric study is conducted for the determination of the effect of the main factors affecting the pounding behavior of the adjacent buildings with different floor levels, including the effects of

separation distance, floor level and distribution of the structural elements in plan. Special emphasis is placed on the case of zero-gap distance between buildings, due to its wide-spread existence in case of actual buildings built in many Cairo districts. The analysis results were used to develop conclusions and recommendations related to the structural behavior of buildings with floors in the same level and floors in different levels subjected to pounding.

Key Words Pounding – adjacent Buildings – Different Floor Levels- Gap Distance – Earthquake – Time History

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