The Optimum Outrigger Locations in Outrigger-Braced Structures with New Governing Equations and Complex Objectives

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Master of Science in Civil Engineering

2010

Faculty of Science and Technology
University of Macau

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A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Science in Civil Engineering

Faculty of Science and Technology
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Supervisor

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Date

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Abstract

OPTIMUM OUTRIGGER LOCATIONS IN OUTRIGGER-BRACED STRUCTURES WITH NEW GOVERNING EQUATIONS AND COMPLEX OBJECTIVE

by Wang XingHua

Thesis Supervisor:

Prof. Er Guo Kang

This thesis is about the numerically analysis of the optimum locations of outriggers in outrigger-braced structure with new governing equations and complex objective. Outrigger-braced structure is a typical structure frequently employed in high-rise building design. It consists of a refined concrete or braced steel main core connected to exterior columns by flexural cantilevers. The moment induced by lateral loadings can be much balanced by the axial forces in the columns, which makes it suitable for high-rise building design. In the preliminary structural design, the locations of the outriggers need being determined first. The analysis for the optimum locations of outriggers was normally based on the objective that the drift reduction is maximum. In outrigger-braced building design, the moment in the core needs also being reasonably reduced in locating the outriggers. In this thesis, a more easily understandable and general solution procedure is employed in analyzing the optimum locations of the outriggers over the height of the building. Two new objectives in obtaining the optimum locations of outriggers are proposed. Based on those objectives, the optimum locations of the outriggers are analyzed numerically which can make base core moment reduced mostly or both the drift and core moment reduced mostly as a whole. Numerically results are presented about the optimum locations of outriggers in various cases and the reduction efficiency. The obtained results are also compared with the conventional results with only the drift reduction being objective.

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ACKNOWLEDGMENTS

First, I would like to express my sincere gratitude and appreciation to my supervisor, Prof. ER Guo Kang, for his enthusiastic guidance and support throughout the course of my research. I benefit a lot from his philosophical perspectives and visions, which make this work an exciting endeavor.

I acknowledge the financial support offered by the Research Committee of the University of Macau.

My sincere appreciation goes to Li Qian, Zhu Haitao, Lan Shuang wen, Liu Xinglu and Guo Xiuxiu for their advices and supports in different ways.

Finally, I am deeply grateful to my parents, my grandfather and my grandmother, to whom this thesis is dedicated for their love and patience in the pursuit of my academic goals.

Wang XingHua

Macao SAR, China

June 10, 2010