COMPARATIVE STUDY OF CONVENTIONAL AND OUTRIGGER STRUCTURE FOR P-DELTA ANALYSIS

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Abstract
The synopsis The People are moving from rural to urban regions, which means that multi-story buildings are needed for both residential and commercial purposes. The issue of shelter has been greatly alleviated by these towering structures.As a result, designers are struggling to find solutions that provide sufficient strength and stability to withstand lateral stresses, which are becoming an increasingly important factor. Accordingly, dynamic analysis should be used to examine high-rise buildings.More elongated and lofty buildings are now popular.The primary goal of this article is to examine the seismic resistance, architectural soundness, and P-delta resistance of conventional and high-rise outrigger structures.
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Keywords: *would Outrigger Structure, P-delta,Concept of outrigger,Conventional outrigger,Virtual outrigger*

1 Introduction

A lot has changed in the world of skyscrapers in the last many years. Lots of people are leaving the countryside for the big cities. Because of this, metropolitan areas are seeing an ever-increasing population density. Land is becoming more scarce and expensive as human density rises. Therefore, the most obvious and effective way to avoid these issues is to construct structures with several stories. Although the exact definition is lacking, any structure with a height more than 35 metres is considered to be a tall building. The location of the building is just as important as its height for determining its classification; for instance, a 12-story structure would not be deemed tall in a highly developed metropolis like Singapore or Hong Kong, but it could be in a less developed city. Several compound aspects are involved in the development of tall structures, such as:

1. Land scarcity in densely populated regions.
2. The need for commercial and residential real estate is on the rise.

3.Thirdly, improvement in technology.
4. Innovations in structural systems.
5. A rise in the economy.
6. Idea of a metropolitan skyline. 16.
7. Prestige and cultural significance.
Eighth, the universal human desire to rise to greater heights.

1.1 Introduction to the Outrigger System and Its Evolution

A mast is a horizontal beam that connects the main canoe-shaped hull of a Polynesian ocean-going boat to exterior stabilising floats. The concept of an outrigger has been employed in tall structures for almost fifty years, although the architectural principles date back millennia. An example of an outrigger system in action is a rustic modern take on this vessel form.

• With only a little "amas floatation" (upward resistance) exerted by outrigger leverage, a narrow boat hull may capsize or overturn when pushed by unexpected waves. Is enough to prevent the structure from toppling over; similarly, building outriggers attached to perimeter columns that can withstand both upward and downward pressures significantly increase the building's resistance to toppling over.Unconformable long period roll may occur in boats that have been ballasted to prevent overturning; however, outrigger attached 'amas' significantly mitigate this behaviour and lessen the building period. We infer the following from this idea:

1. The purpose of the outriggers is to dampen the core's natural tendency to topple over, which would occur in a pure cantilever. The lowered moment is then transmitted to columns outside the core by tension compression coupling, which makes use of the increased moment arm between these columns. The second important function is to weaken the connection between the stepped mast and the keel beam.

3. Reducing the base core over-turning moments and the corresponding decrease in possible core uplift pressures achieves the same advantages in high-rise buildings.

The Outrigger System (1.2) Concept

A time-honored method of reducing the effect of wind on sails, the outrigger system has been in use for centuries. In a ship analogy, the central core may represent the mast, the outriggers the spreaders, and the outside columns the stays of the tall edifice.

The Outrigger System Has 1.3 Benefits.

• In resisting overturning moment, all outside columns are involved, not just specific outrigger columns.
• Applying a reverse moment to the core at each outrigger connection helps lessen core overturning moments.
• Simple beam and column framing may be used for outside framing instead of rigid-frame type connections, which reduces the total cost.

Without the column and foundation structure, uplift and net tension stresses may be reduced or eliminated.
• The area between the building's core and outside does not have any trusses.

Instabilities in the Outrigger System 1.4

The notion of outriggers has limited practical usage due to a number of issues related to their utilisation: Especially since the outrigger is diagonally shaped, the floor on which it is positioned is not suitable for usage.
Large outrigger columns may not be able to be positioned where an outrigger beam projecting from the core may contact them most easily due to architectural and functional constraints.

• When using a concrete shear-wall core, the connections between the outrigger trusses and the core may be somewhat complicated. • When subjected to a gravity load, the core and the outrigger columns will not shorten to the same extent. As they attempt to limit the differential

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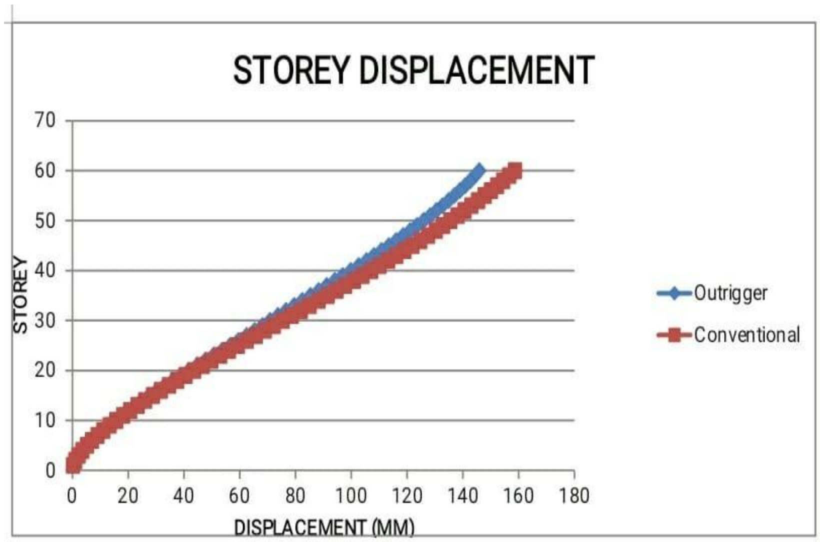
shortening between the outrigger columns and the core, the very stiff outrigger trusses may be subjected to multiple stresses.

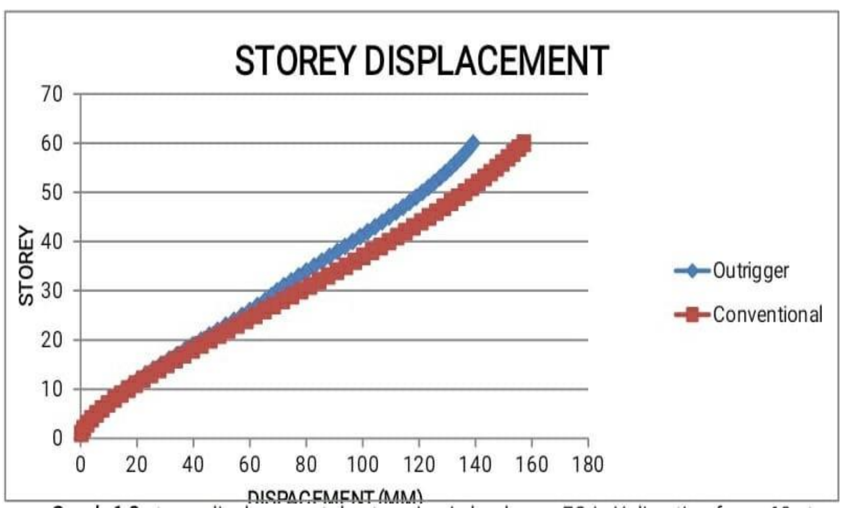
2 RESULTS

From the models prepared in etab software for G+60,G+70,G+80 the output results graph are prepared for storey drift and storey displacement.

STOREY DISPLACEMENT

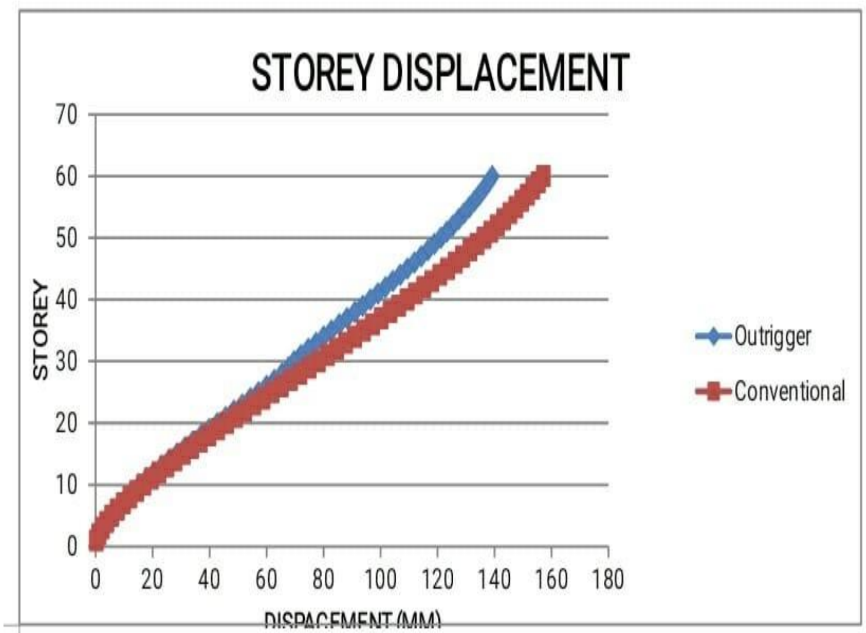


STOREY DISPLACEMENT G+60 X



STOREY DISPLACEMENT G+60 Y

STOREY DISPLACEMENT G+70 x



STOREY DISPLACEMENT G+70 Y

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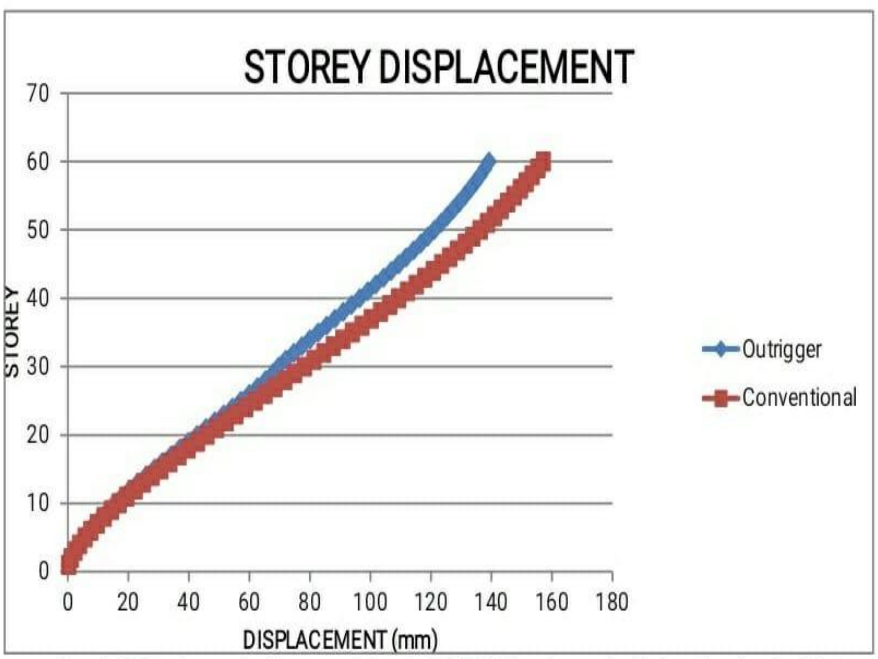
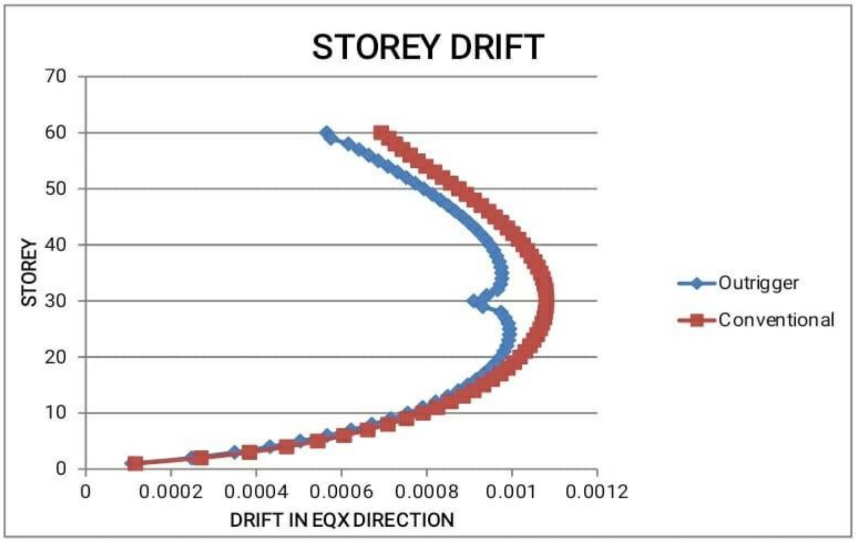
STOREY DISPLACEMENT G+80 X

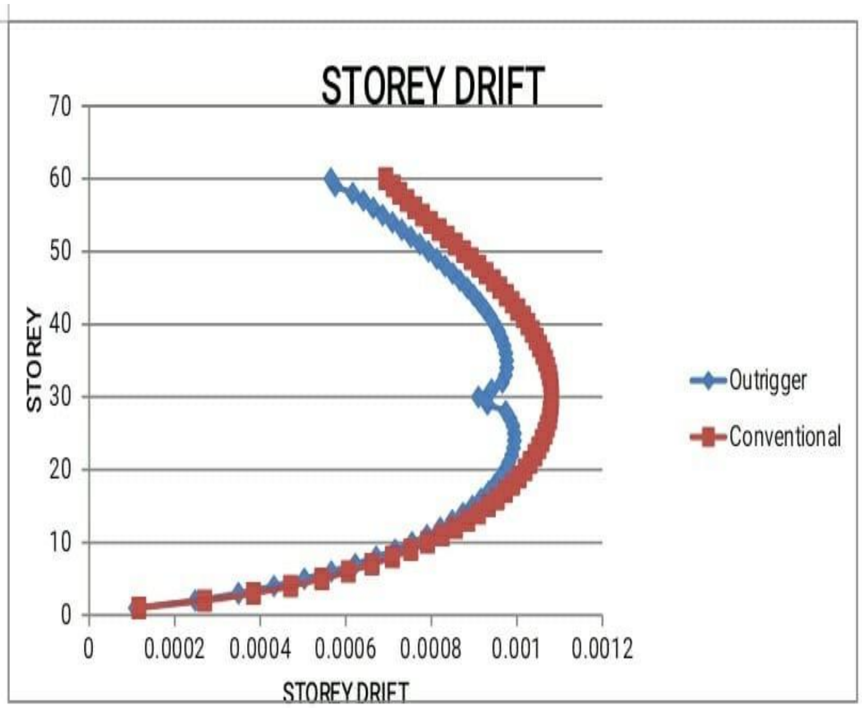


STOREY DISPLACEMENT G+80 Y

STOREY DRIFT RESULTS



STOREY DRIFT G+60X



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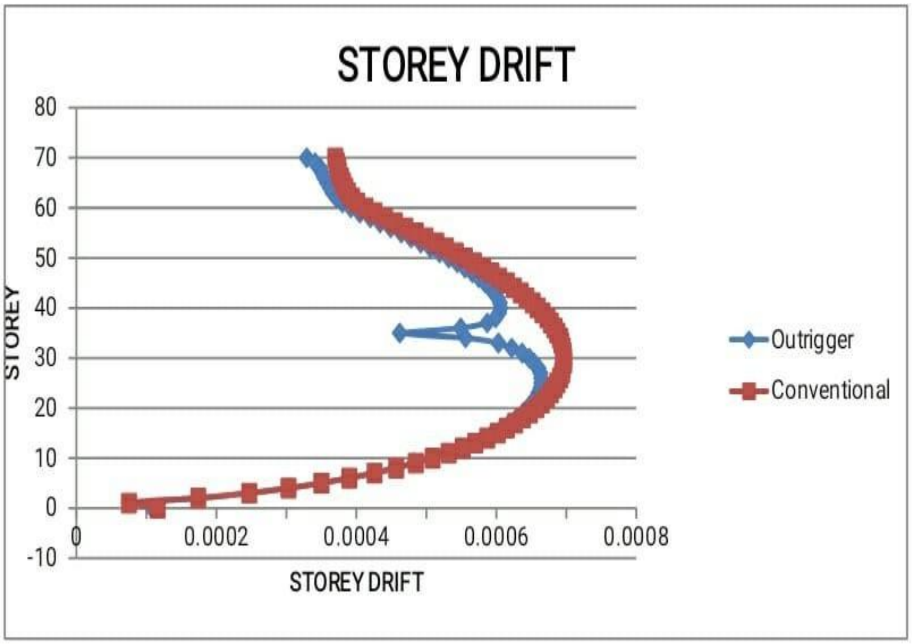

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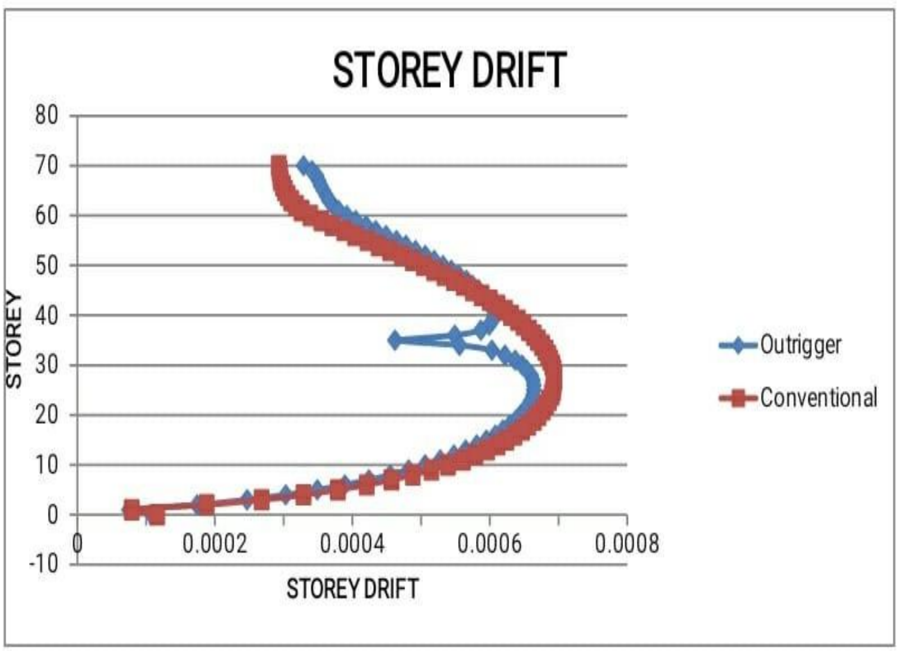
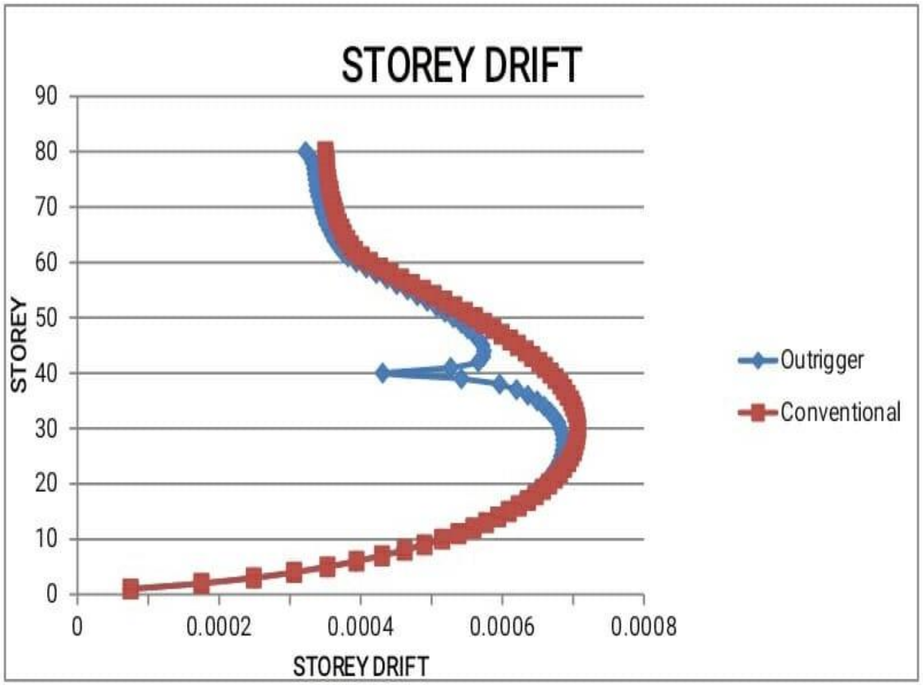
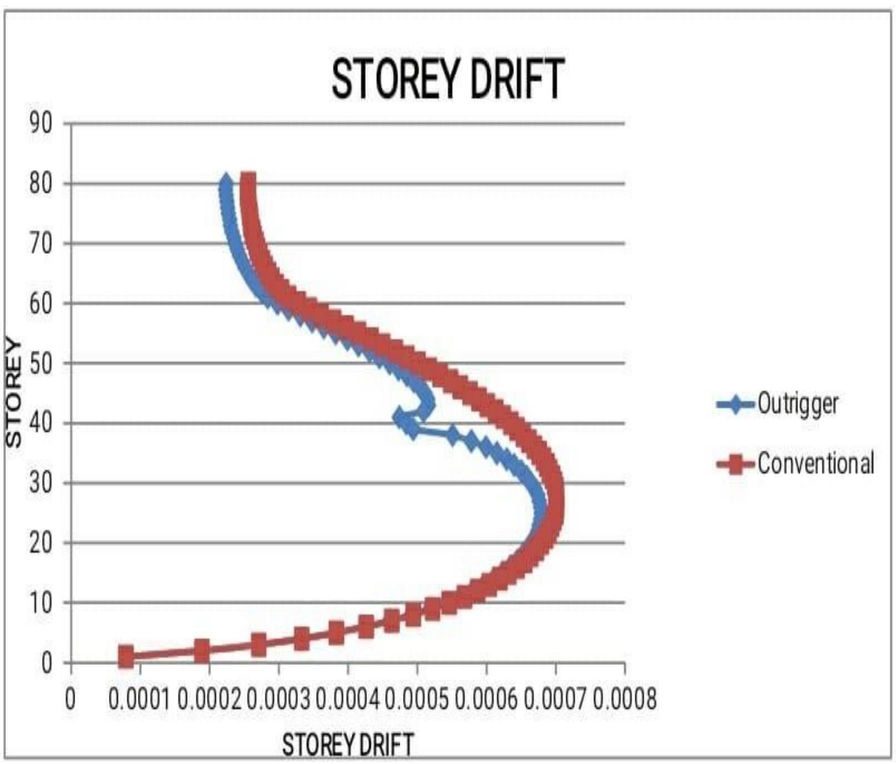


STOREY DRIFT G+70 Y



STOREY DRIFT G+80 X



STOREY DRIFT G+80

RESULTS

The following inferences are made from the data analysis:-

1.To make tall structures more efficient under seismic and wind stress, outrigger systems are used. This boosts the structure's rigidity.

2. Outriggers have a lower top story displacement than conventional structures.The outrigger structure has a lower displacement than the standard construction.

3.Compared to conventional structures, outrigger structures have less storey drift.

4. The outrigger structure acts as a high drift controller in comparable static analysis, wind analysis, and response spectrum analysis, as seen clearly in the storey drift graph.In a storey drift graph, the outrigger effect is most noticeable at the outrigger storeys, where the graphs exhibit a large kink.

5.When looking at the two most important metrics, displacement and drift, it is clear that the outrigger structure has a lower p-delta impact than the traditional construction.

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