UNIVERSITY OF MORATUWA
SRI LANKA

DYNAMIC BEHAVIOUR OF CONCRETE FRAMED HIGH RISE BUILDINGS SUBJECTED TO LATERAL LOADS

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ABSTRACT

In the recent past, high-rise buildings have become very popular in Sri Lanka. It is pertinent to mention that 25 years back, our tallest building would not have more than 14 storeys. Today the Colombo skyline is covered with many high rise building ranging from 5 to 35 stories. In city centres, the tendency to have a liking for high-rise buildings are due to many reasons, such as non-availability and shortage of land, convenience in operational activities by having most of the commercial activities located in one building, aesthetics, prestige etc. In par with this, there had been many developments in the construction industry and it is worth mentioning that the development that has been taken place in the concrete technology have made buildings much more slender and lighter than the buildings constructed 25 years back.

In the design of high-rise buildings, it is extremely important to control the wind-induced acceleration in buildings to an extent so that it is within the acceptable limits. If this condition could be achieved, majority of occupants would not feel discomfort due to the wind induced movements of the building. It is necessary for the structural designer to evaluate the dynamic behaviour of the building at the early stage of the design, by adopting appropriate wind speeds. This means, that the design engineer has to optimize the lateral load resisting system by having an efficient and pertinent structural arrangements.

In tall flexible buildings, it is important to control the drift of the structure which is generally expressed as a drift index. If excessive drift occurs, occupants may find it disturbing and at the same time it would affect the stability of partitions and finishes. It is interesting to note that the excessive drift can be controlled by changing the geometric configuration of the structure, increasing the bending stiffness of horizontal members and adding additional stiffness using core members, coupling the shear walls and providing the outriggers.

This study was carried out to determine the optimum use of outriggers for controlling the wind-induced behaviour on tall buildings. A detailed case study was carried out for thirty and forty storey buildings for various loading conditions by providing outriggers at different levels. The results of this study can be used as guidance for controlling deflection and acceleration due to wind effect in tall buildings.

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Due to the enormous challenges in the industry I strongly believe that every practicing structural engineer should enhance his knowledge by attending to a similar course so that they will be fully aware of the developments in the industry and equipped to confront any situation.

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