

MULTI STOREY RESIDENTIAL BUILDING ANALYSIS AND DESIGN USING DIFFERENT METHODS

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Abstract

In order to compete in the ever growing competent market it is very important for a structural engineer to save time. As a sequel to this an attempt is made to analyze and design a multistoried building by using a software package STAAD pro. For analyzing a multi storied building one has to consider all the possible loadings and see that the structure is safe against all possible loading conditions. There are several methods for analysis of different frames like kani's method, cantilever method, portal method, Matrix method.

Keyword:- Analysis, Multistoried Building , Design.

Introduction

Building construction is the engineering deals with the construction of building such as residential houses. In a simple building can be define as an enclose space by walls with roof, food, cloth and the basic needs of human beings. In the early ancient times humans lived in caves, over trees or under trees, to protect themselves from wild animals, rain, sun, etc. as the times passed as humans being started living in huts made of timber branches. The shelters of those old have been developed nowadays into beautiful houses. Rich people live in sophisticated condition houses.

Buildings are the important indicator of social progress of the county. Every human has desire to own comfortable homes on an average generally one spends his two-third life times in the houses. The security civic sense of the responsibility. These are the few reasons which are responsible that the person do utmost effort and spend hard earned saving in owning houses. Nowadays the house building is major work of the social progress of the county. Daily new techniques are being developed for the construction of houses economically, quickly and fulfilling the requirements of the community engineers and architects do the design work, planning and layout, etc, of the buildings. Draughtsman are responsible for doing the drawing works of building as for the direction of engineers and architects. The draughtsman must know his job and should be able to follow the instruction of the engineer and should be able to draw the required drawing of the building, site plans and layout plans etc, as for the requirements.

Material and Methodology

Method of flexibility coefficients:

The method of analysis is comprises reducing the hyper static structure to a determinate structure form by: Removing the redundant support (or) introducing adequate cuts (or) hinges.

Limitations:

1. It is not applicable for degree of redundancy > 3

Slope displacement equations:

It is advantageous when kinematic indeterminacy < static indeterminacy. This procedure was first formulated by axle bender in 1914 based on the applications of compatibility and equilibrium conditions. The method derives its name from the fact that support slopes and displacements are explicitly computed. Set up simultaneous equations is formed the solution of these parameters and the joint moment in each element or computed from these values.

Limitations:

1. A solution of simultaneous equations makes methods tedious for manual computations. This method is not recommended for frames larger than two bays and two storeys.

Iterative methods: These methods involve distributing the known fixed end moments of the structural member to adjacent members at the joints in order to satisfy the conditions of compatibility.

Limitations of Hardy Cross method:

1. It presents some difficulties when applied to rigid frame especially when the frame is susceptible to side sway. The method cannot be applied to structures with intermediate hinges.

Kani's method:

This method overcomes some of the disadvantages of the Hardy Cross method. Kani's approach is similar to H.C.M. to that extent it also involves repeated distribution of moments at successive joints in frames and continuous beams. However, there is a major difference in the distribution process of the two methods. H.C.M. distributes only the total joint moment at any stage of iteration. The most significant feature of Kani's method is that the process of iteration is self-corrective. Any error at any stage of iterations is corrected in subsequent steps, consequently skipping a few steps. An error at any stage of iteration is corrected in subsequent steps, consequently skipping a few steps of iterations either by oversight or by intention does not lead to error in final end moments.

Advantages:

1. It is used for side way of frames.

Limitations:

1. The rotation of columns of any storey should be functioning as a single rotation value of the same storey.
2. The beams of storey should not undergo rotation when the column undergoes translation. That is, the column should be parallel.
3. Frames with intermediate hinges cannot be analyzed.

Approximate method:

Approximate analysis of hyperstatic structures provides a simple means of obtaining a quick solution for preliminary design. It makes some simplifying assumptions regarding structural behavior so as to obtain a rapid solution to complex structures.

The usual process comprises reducing the given indeterminate configuration to a determinate structural system by introducing adequate numbers of hinges. It is possible to sketch the deflected profile of the structure for the given loading and hence to locate the points of inflection. Since each point of inflection corresponds to the location of zero moment in the structures, the inflection points can be visualized as hinges for the purpose of analysis. The solution of structures is simplified once the inflection points are located. The loading cases are arising in multistoried frames, namely horizontal and vertical loading. The analysis is carried out separately for these two cases.

Horizontal cases:

The behavior of a structure subjected to horizontal forces depends upon its height to width ratio among other factors. It is necessary to differentiate between low rise and high rise frames in this case.

Low rise structures:

Height < width

It is characterized predominantly by shear deformation.

High rise buildings

Height > width

It is dominated by bending action

Matrix analysis of frames:

The individual elements of frames are oriented in different directions unlike those of continuous beams, so their analysis is more complex. Nevertheless, the rudimentary flexibility and stiffness methods are applied to frames. The stiffness method is more useful because of its adaptability to computer programming. The stiffness method is used when

degree of redundancy is greater than degree of freedom. However stiffness method is used degree of freedom is greater than degree of redundancy especially for computers.

Conclusion

Civil engineering structures are created to serve some specific functions like human habitation, transportation, bridges, storage etc. in a safe and economical way. A structure is an assemblage of individual elements like pinned elements (truss elements), beam element ,column, shear wall slab cable or arch. Structural engineering is concerned with the planning, designing and thee construction of structures.

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