

Buckling Analysis of Columns with or without Bracing

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Abstract - Steel frame is one of the structural systems used to resist buckling loads and buckling of multi-storey structures. We are introducing different type of bracing systems like forward, backward, X, inverted V having I and H cross section. To determine the best bracing system with the help of FEA analysis using ANSYS software. To perform maximum relative deformation of structure after entering the plastic region which goes to dissipate much lateral load. To improve the ductility and stiffness of structure by providing different type of bracings have cross sections I and H.

1. INTRODUCTION

The development of lateral bracing system is important parameter in multi storey construction.

The ductile element (bracing) is provided to prevent the collapse of structure under external earth quake.

Bracing system which has good ductility and stiffness only by changing the shape of bracing. Using forward bracing, backward bracing, X bracing, inverted V bracing having H and I cross section strengthen against lateral force particularly earthquake forces. In the frame system, the cyclic behavior of structure encounters the narrowing phenomenon of elastic region curve.

1.1 Objective

- To study the buckling behaviour of frame structure.
- To study the different types of bracing system.
- To compare two conditions, bracing with and without.

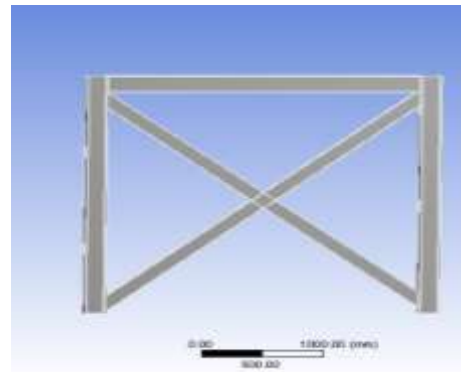
1.2 Scope

- To increase the ductility and stiffness in plastic region of steel frames.
- To reduce the weight of steel frame members.
- To introduce the energy absorption bracing systems for earthquake resistant structures.

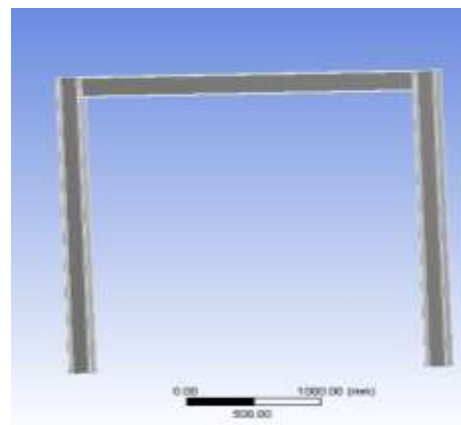
2. METHODOLOGY

- Literature review: To cover the past studies and understand the enhancement that can be provided for the present work.
- Modelling: To create different type of model using ANSYS software.
- To apply the boundary condition.
- Analysis of structure: Different type analysis using ANSYS software.
- Analysis of results: The result will be analyzed and compared the all the types of models.

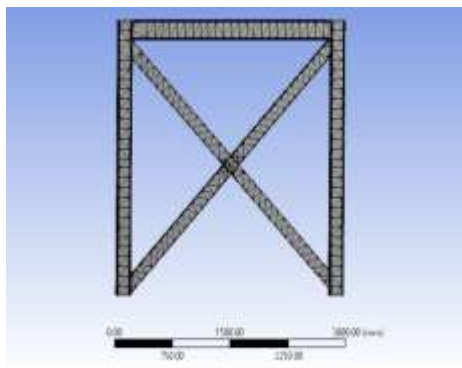
3. RESULT AND REVIEW



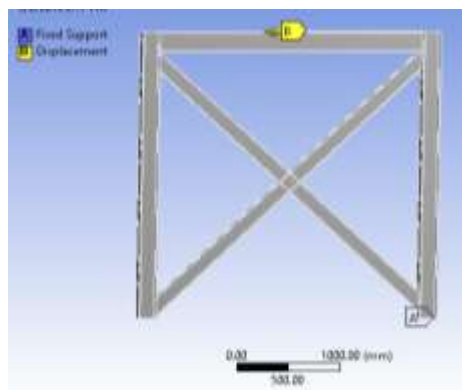
Geometry Model1: X bracing



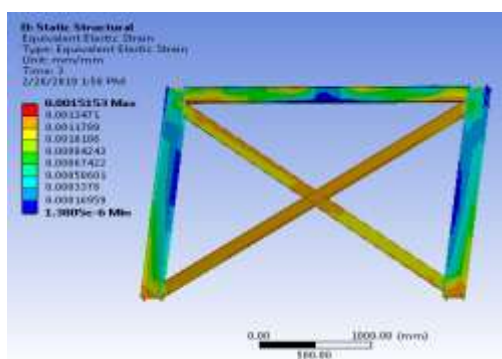
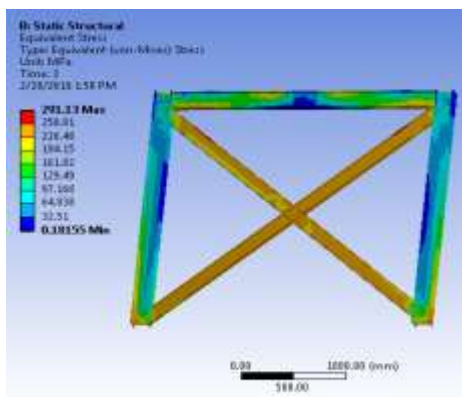
Geometry Model 2: Without bracing



Mesh model: X bracing



Boundary condition: X bracing



GEOMETRY				
MEMBER	DEPTH MM	WEB THICKNESS MM	FLANGE WIDTH MM	FLANGE THICKNESS MM
COLUMN	164	5.3	91	8
BEAM	183	5.6	100	8.5
BRACE(I)	126.2	5.6	73	6.9
BRACE(H)	73	5.6	73	6.9

Table -1: Sample Table format

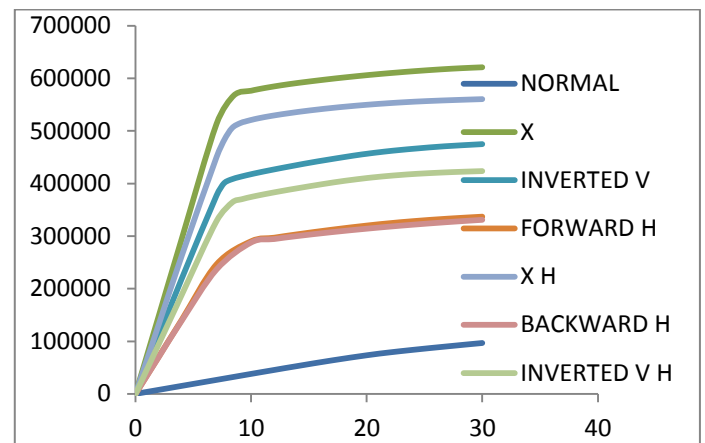


Chart -1: Displacement vs Force reaction

4. CONCLUSIONS

- Non linear and buckling behaviour of different types of bracing structure in single storey model is analyzed.
- In non linear lateral loading condition we are used normal system, X bracing, forward bracing, backward bracing, inverted V bracing system.
- In non linear loading condition X bracing is better compare to inverted V bracing, forward bracing, backward bracing and normal system.
- X - I cross section is better than other H and I cross section bracing system.
- In buckling analysis X- I cross section bracing system is better than other bracing systems.
- In base storey grid alignment X bracings is restrained by lateral, axial, non linear and buckling condition

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