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FEA FOR A SHEAR WALL BY USING SOLID 186 ELEMENT FOR DIFFERENT OPENING CASE

Mantoo Singh[1], Naresh Nischol Harry[2], yeetendra kumar Bind[3]

[1] PG Student Department of *Civil Engineering Vaugh Institute of Agriculture Engineering and Technology, Shuats, Prayagraj Up India*,
[2]Assistant Professor Department of Civil *Engineering Vaugh Institute of Agriculture Engineering and Technology, Shuats Prayagraj U.P India*,
[3]*H.O.D Department Of Civil Engineering Vaugh Institute Of* Agriculture *Engineering And Technology, Shuats,Prayagraj U.P India* ,

I .INTRODUCTION

Abstract— This Paper Is Presenting Shear Wall Is Used To Resisting The Lateral Loads In Multi-Storey Building That May Be Induced By The Effect Of Dead Load, Wind And* Earthquakes. *The Study Show That Different Reinforcement Layouts Affect The Response Of The Wall And The Difference In Crack Width Is Mainly Due To The Boundary Reinforcement. In The Condition Of Crack Widths Calculated By Using The Information From Ansys Seem To Be Promising And Useful When Designing And Analysing Structures In Seismic Zones. Four Shear Wall Models With Different Opening Sizes Are Analysed. The Solid 186 Element Is Used For Different Opening Case And Shear Stress, Shear Strain Analysis For Varying Load And Cycling Load. Due To Various Loading Defomation, Shear Sress And Shear Strain Produced. In Larger Opening Case All The Phenomenon Is More Than Smaller Open Case.

Keywords: Digital Prototype Of Shear Wall With Opening, Fea Of Solid186 Element, Ansys.

Shear wall is essential need of multy storey building. In structural engineering, shear wall is a vertical element of a seismic force resisting system that is designed to resist in plane lateral forces typicaly wind and seismic loads. In many jurisdiction, the international residential code govern the design of shear wall.
ABOUT Shear Wall
Reinforced concrete buildings often have up-and-down plate-like RC walls called Shear Walls in addition to slabs, beams and columns. The walls generally start at foundation level and are continual throughout the building height. Their thickness can be as low as 152mm, or as high as 395mm in high rise buildings. Shear walls are usually given along both length and width of buildings. Shear walls are like straight up-and-down-oriented wide beams that carry earthquake load downwards to the foundation. Properly designed and described explained buildings with shear walls have shown very good performance in past earthquakes.

About ANSYS software
ANSYS advance and markets finite element analysis software used to replicate Engineering problems . The software fabricate replicate computer model of structure, electronics, or machine inherent to prevaricate strength, toughness , elasticity temperature dispersal ,electromagnetism , fluid flow ,and other attributes. ANSYS is used to determine how a product will function with different specification, without building test products or conducting crash tests. For example ANSYS software may simulate how a bridge will hold up after years of traffic , how to best process salmon in a cannery to reduce waste, or how to design a slide that uses less material without sacrificing safety most ANSYS simulation are performed using the ANSYS work bench software , which is one of the company ‘ main product. Typically ANSYS users break down larger structure into small component that are each modeled and tested individually. A user may start by defining the dimention of an object and then adding weight, pressure, temperature and other physical properties. Finally , the ANSYS software imitate and scrutinize movement , fatigue fracture , fluid flow , temperature distribution electromagnetic effectualness and other effects over time.

MATERIAL AND METHOD

Design and construction of open shear wall
On the design of shear walls with openings on different load response using extended three dimensional analysis of wall. This report gives a detailed explanation of how ANSYS structure can be effectively used to design shear walls.There are four open in shear wall taken after the analysis different distance with the help of loading.The opening size are taken 1m×0.5m, 1m×1m, 1m×2m, and 1m×3m.
Ten-story Shear wall
This example presents the analysis of a 10-story Shear wall under varying load effects shaking and cycle load. Gravity forces due to live and dead load are computed. For this reason, shear stress checks, shear wall design, and detailing are not discussed. For detailed of the seismic-resistant design of structural shear wall buildings. The analysis of the structure

is performed using element analysis methods: 3D modal-response-spectrum analysis based on the requirements of Provisions. 3D modal element analysis methods using a suite of different open size of shear wall based on the requirements of Provisions. The special attention is given to applying the Provisions rules for orthogonal loading and accidental torsion. All analyses were performed using the finite element analysis program ANSYS.

Modeling of Shear Wall

SOLID186 Element Description

SOLID186 is a high order 3-D 20-node solid element that exhibits quadratic displacement behavior. This element is defined by 20 nodes have three degrees of freedom per node: translations in the nodal x, y, and z directions. The element supports plasticity, creep, stress stiffening, large deflection, and large strain capabilities. It also has mixed formulation capability for simulating deformations of nearly incompressible elastoplastic materials, and fully incompressible materials.

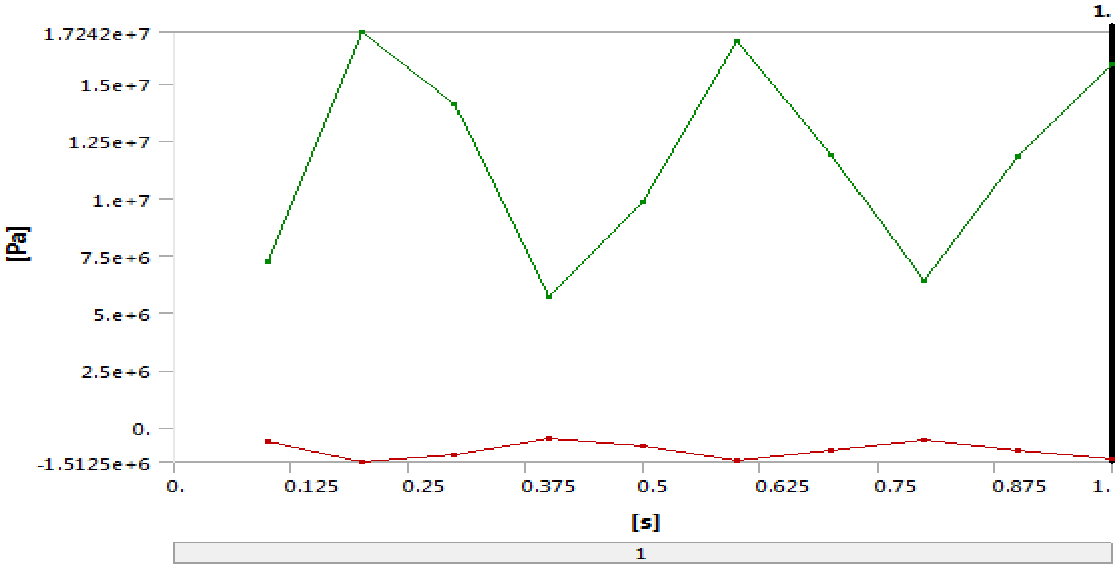
SOLID186 is available in two forms:

1. Uniform Structural Solid (KEYOPT(3) = 0, the default) -- See "SOLID186 uniform Structural Solid Element Description ".
2. Stratified Structural Solid (KEYOPT(3) = 1) -- See "SOLID186 Stratified Structural Solid Element Description".

A other half version of the SOLID186 element is SOLID185. SOLID186 uniform Structural Solid Element Description. SOLID186 unifom Structural Solid is well suited to modeling irregular meshes (such as those produced by various CAD/CAMsystems). .

RESULT AND DISCUSSION

Result for solid wall



Graph.1 Shear stress on cycling and varying load in solid shear wall.

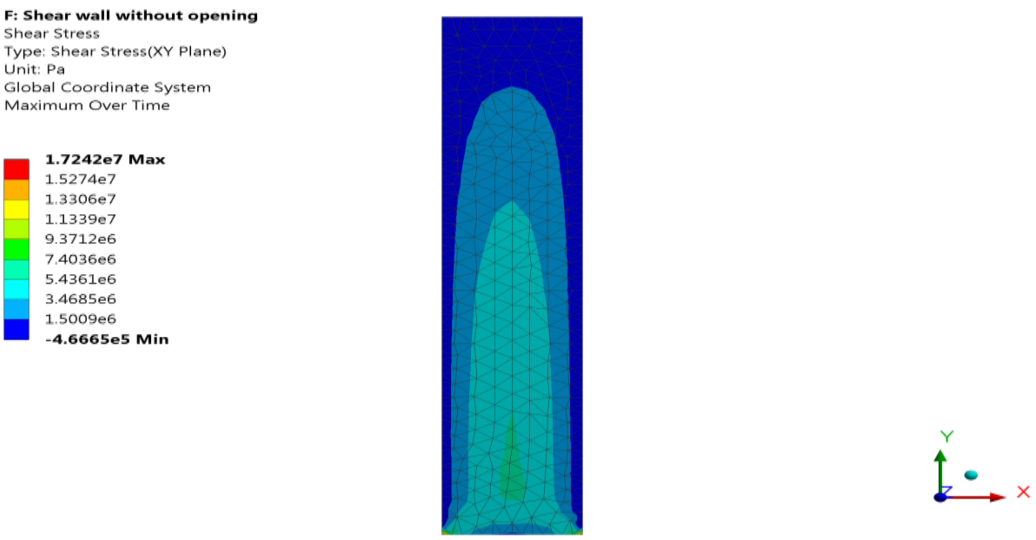


Fig .1 Shear Stress in solid shear wall.

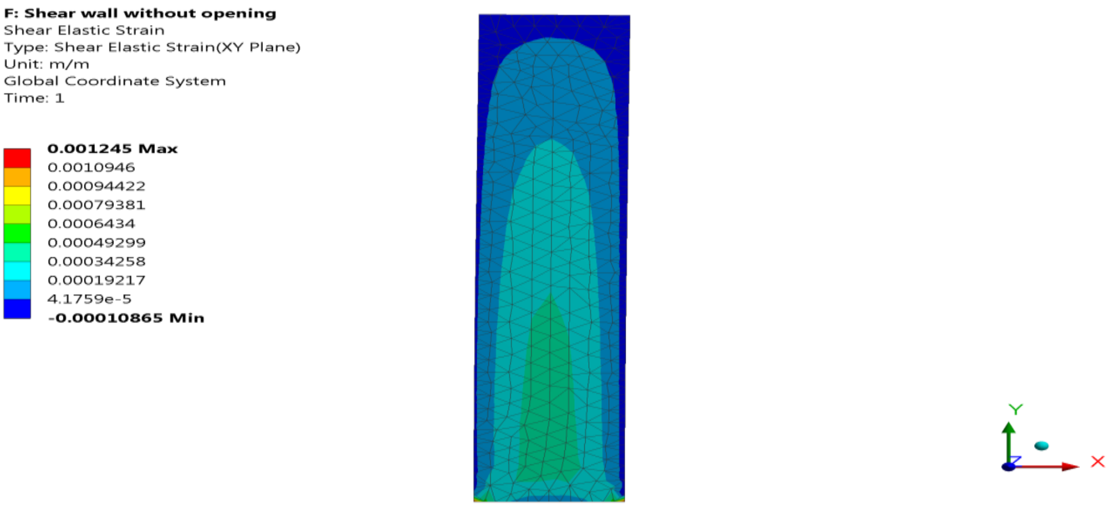
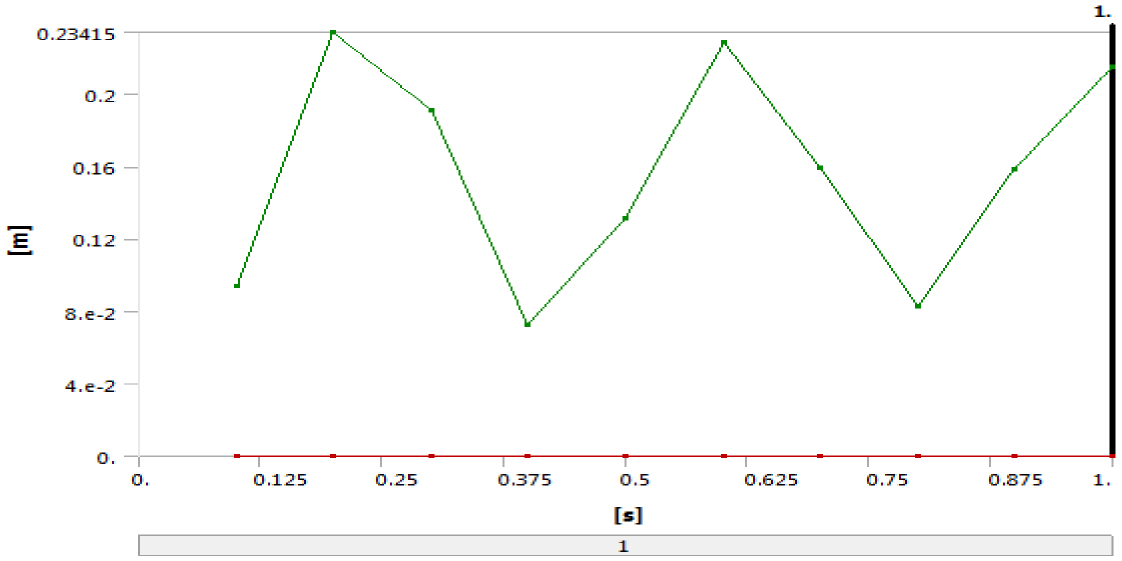


Fig.2 Shear strain in solid Shear wall.



Graph .2 Deformation on cycling and varying Loading solid Shear wall.

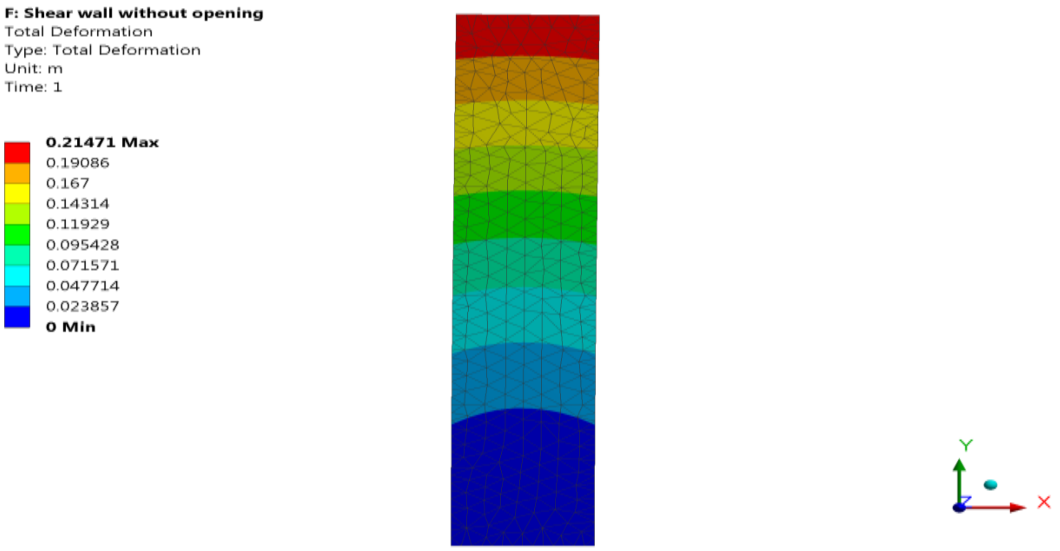
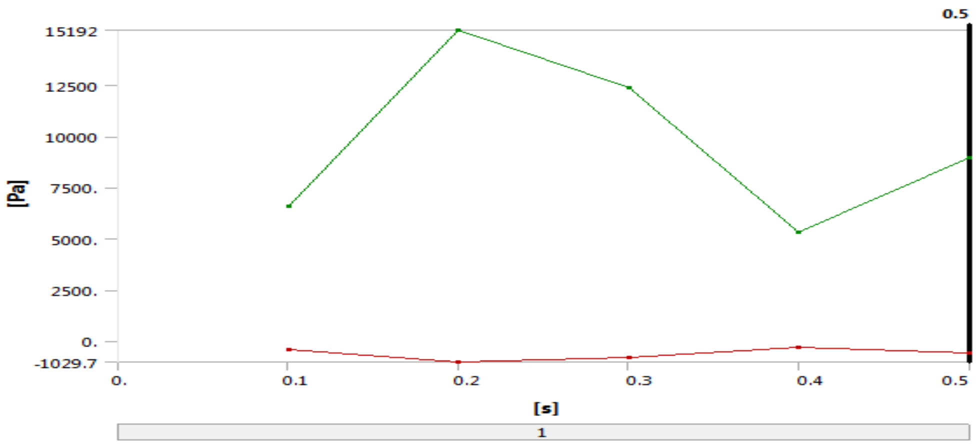


Fig .3 Total deformation in solid Shear wall.

Result for 1m x 0.5m Opening shear wall :



Graph . 3 Shear stress on cycling and varying Load in 1m x 0.5m Opening shear wall.

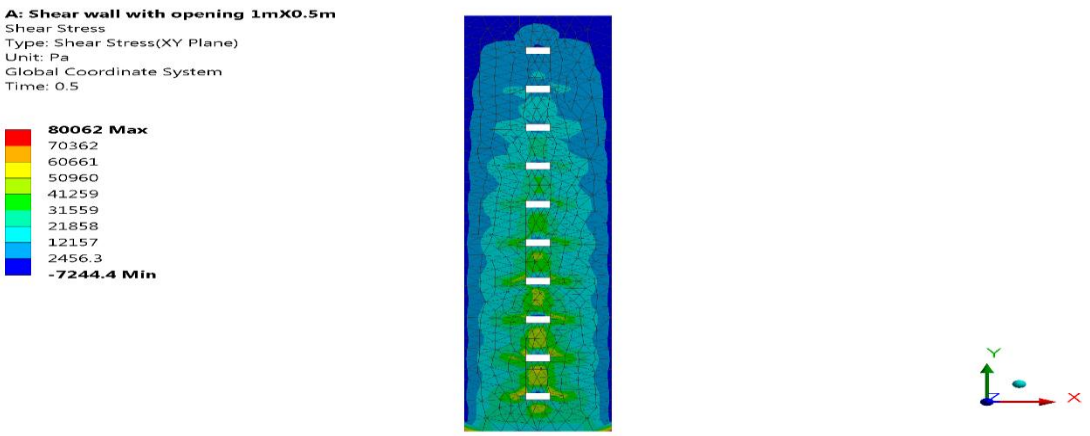


Fig. 4 Shear Stress in 1m x 0.5m Opening shear wall.

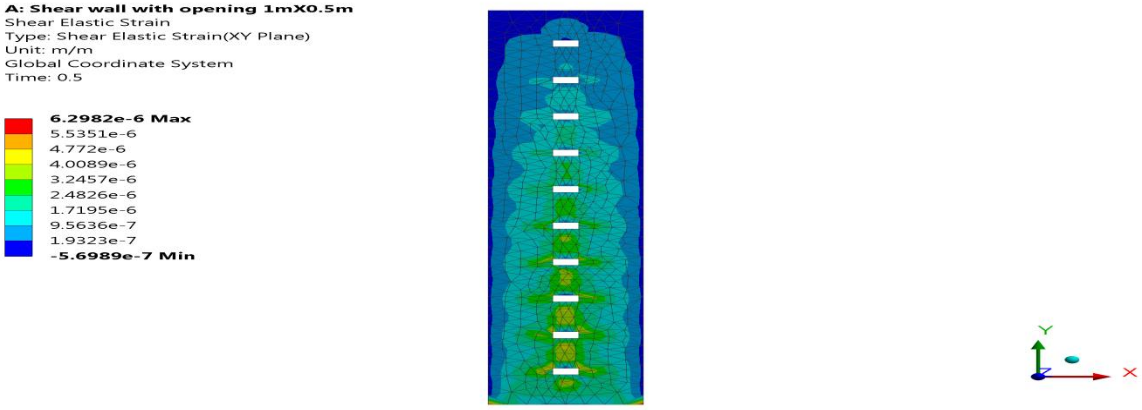
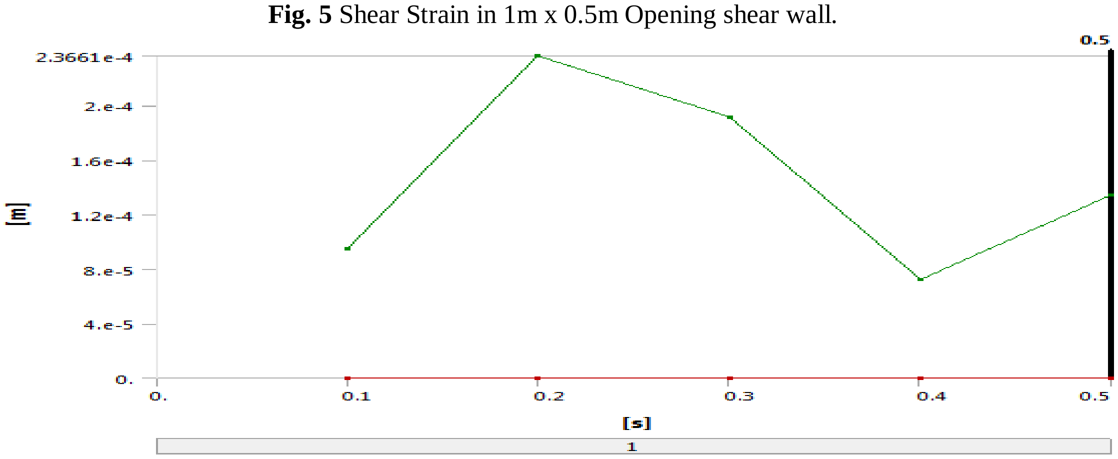


Fig. 5 Shear Strain in 1m x 0.5m Opening shear wall.



Graph. 4 Deformation on cycling and varying Load in 1m x 0.5m Opening shear wall.

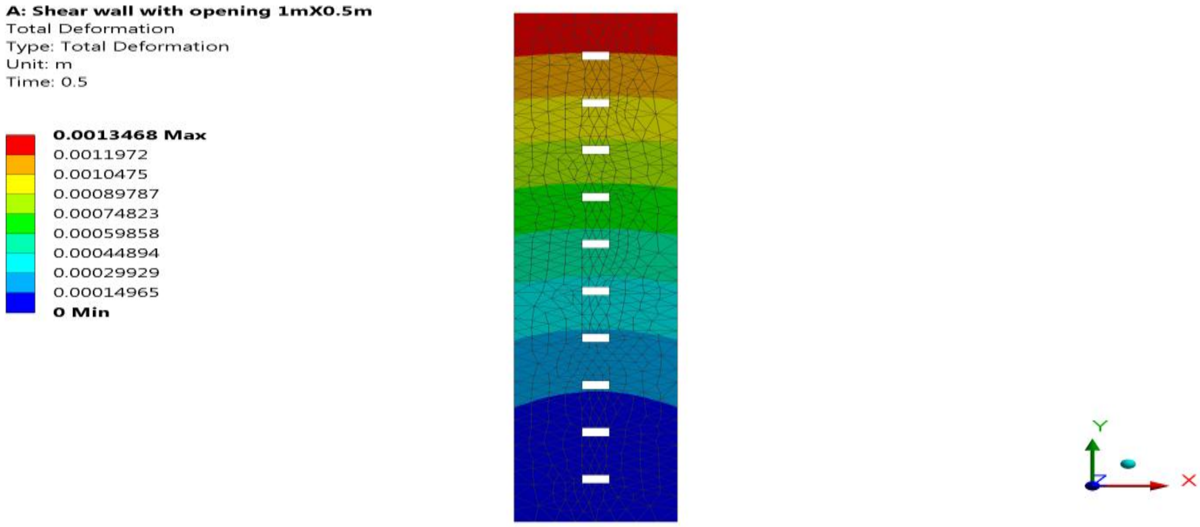
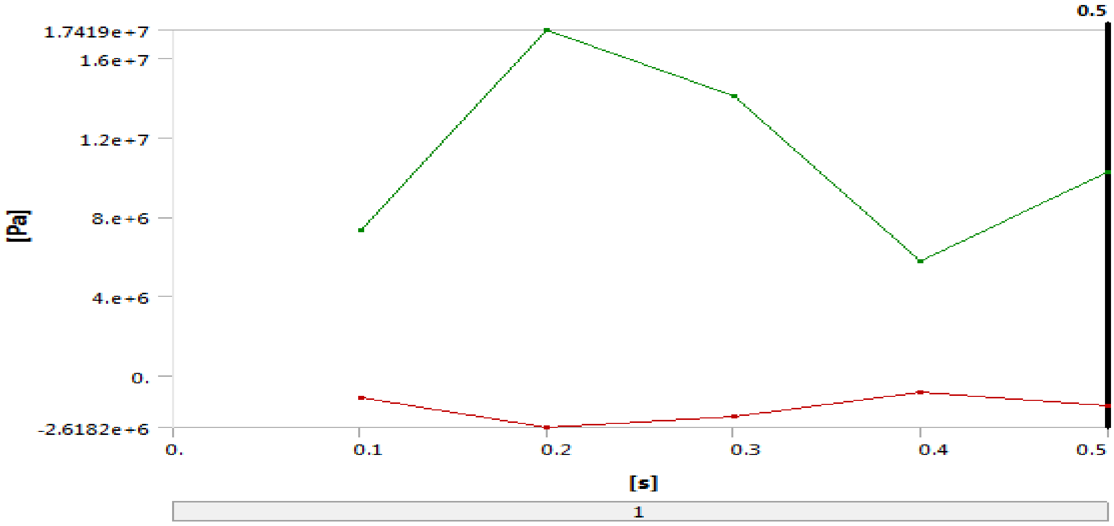


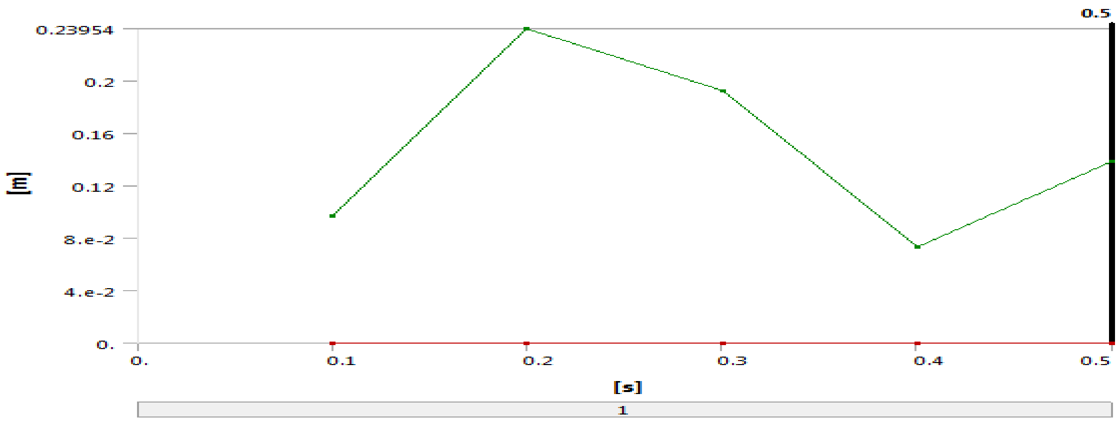
Fig. 6 Total deformation in 1m x 0.5m Opening shear wall

Result for 1m x 1m Opening shear wall:



Graph . 5 Shear stress on cycling and varying Loading 1m x 1m Opening shear wall.

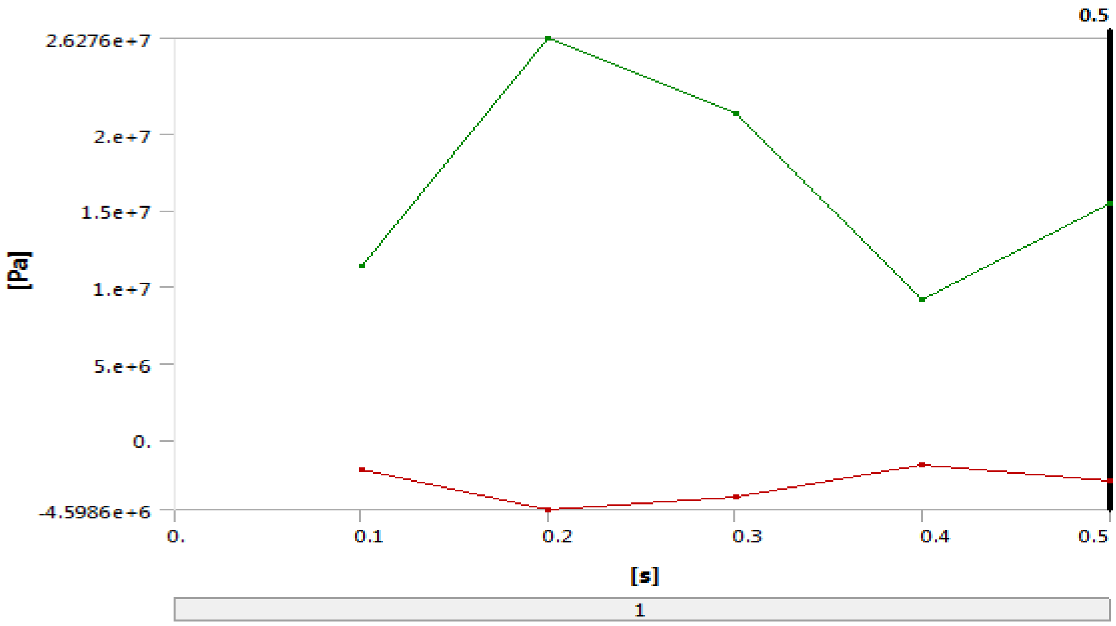
Fig. 7 Shear Stress in 1m x 1m Opening shear wall. F**ig. 10** Shear Strain in 1m x 1m Opening shear wall.



Graph .6 Deformation on cycling and varying load in 1m x 1m Opening shear wall.

Fig. 8 Total deformation in 1m x 1m Opening shear wall.

Result for 1m x 2m Opening shear wall:



Graph.7 Shear stress on cycling and varying Load in 1m x 1m Opening shear wall.

Fig. 10 Shear Stress in 1m x 2m Opening shear wal

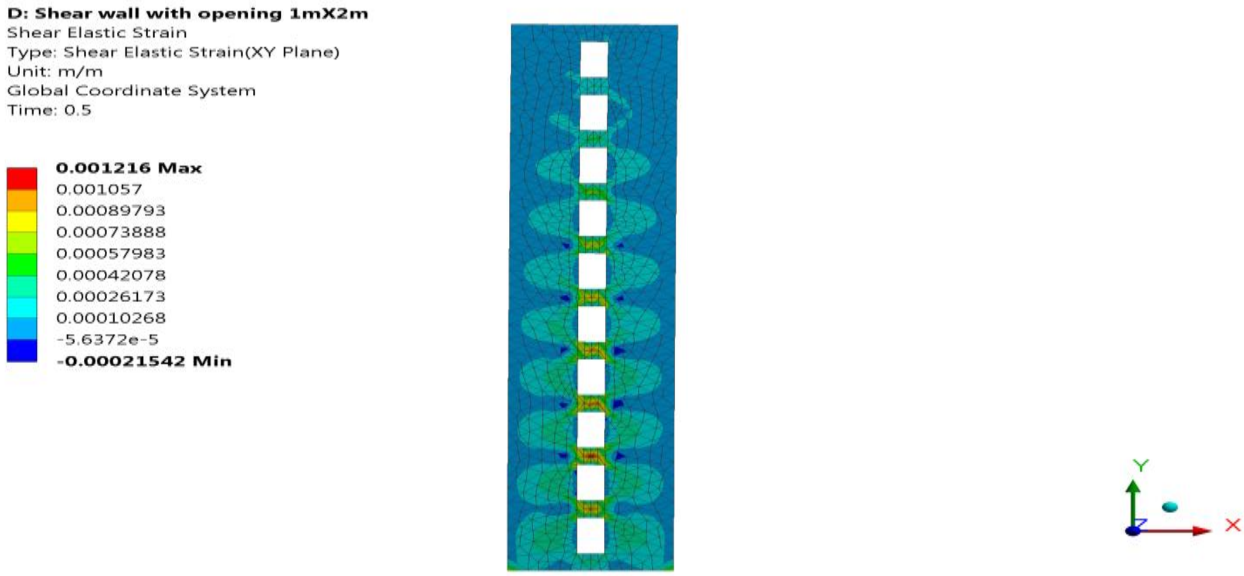
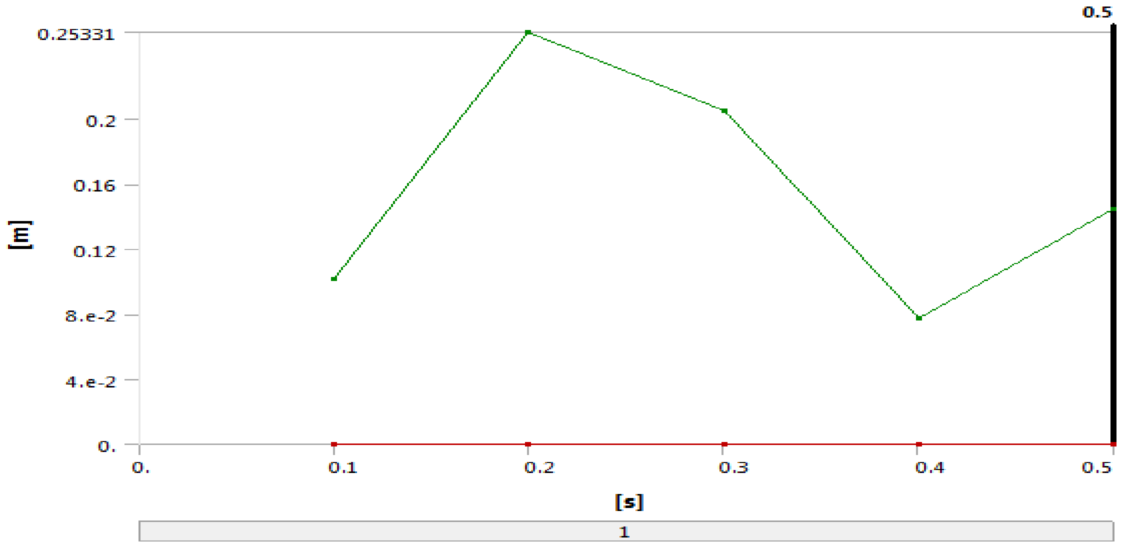


Fig. 11 Shear Strain in 1m x 2m Opening shear wall.



Graph.8 Deformation on cycling and varying load in 1m x 2m Opening shear wall.

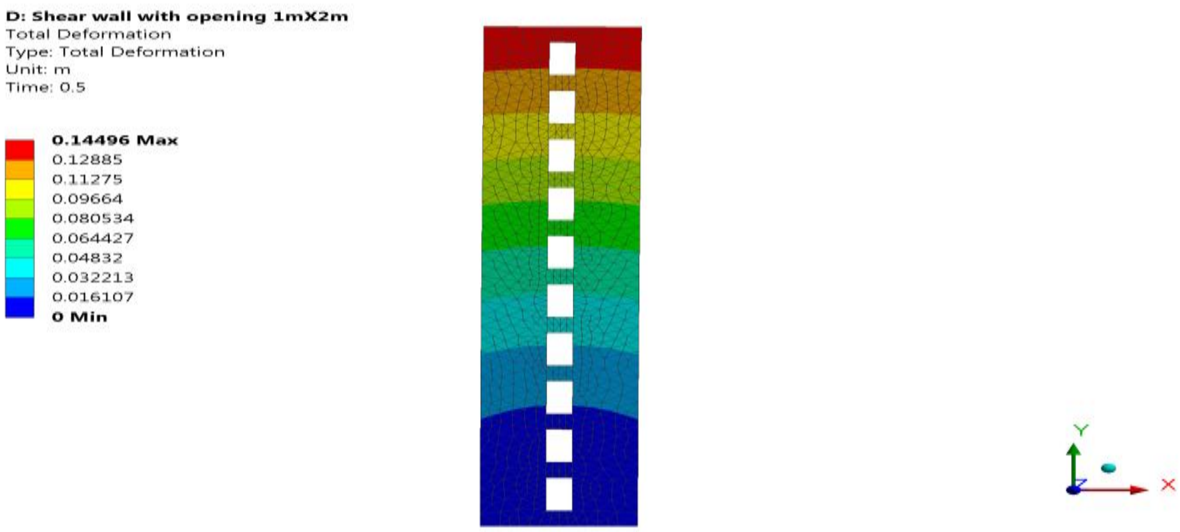
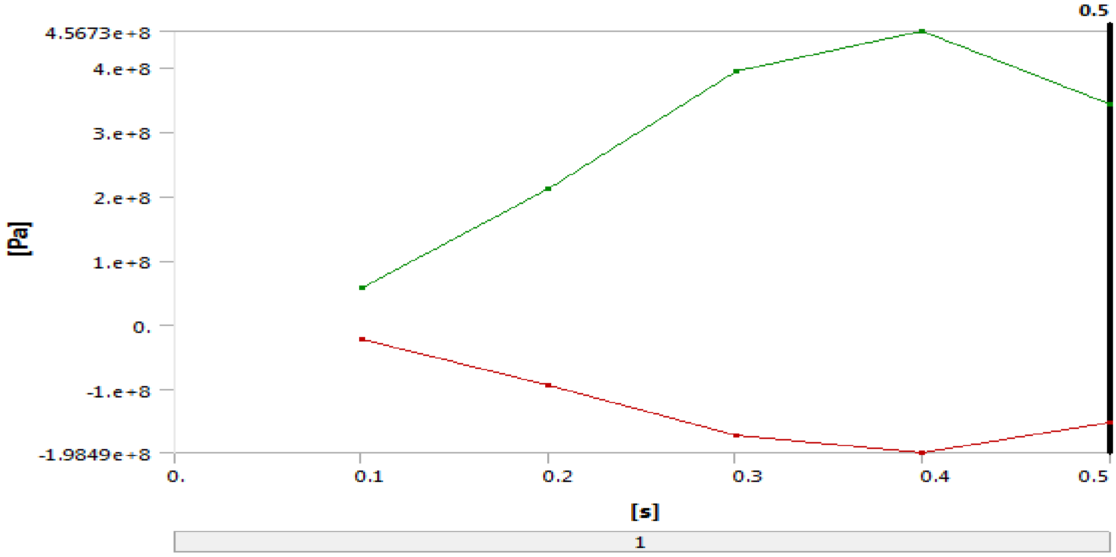


Fig. 12 Total deformation in 1m x 2m Opening shear wall.

Result for 1m x 3m Opening shear wall:



Graph.9 Shear stress on cycling and varying load in 1m x 3m Opening shear wall.

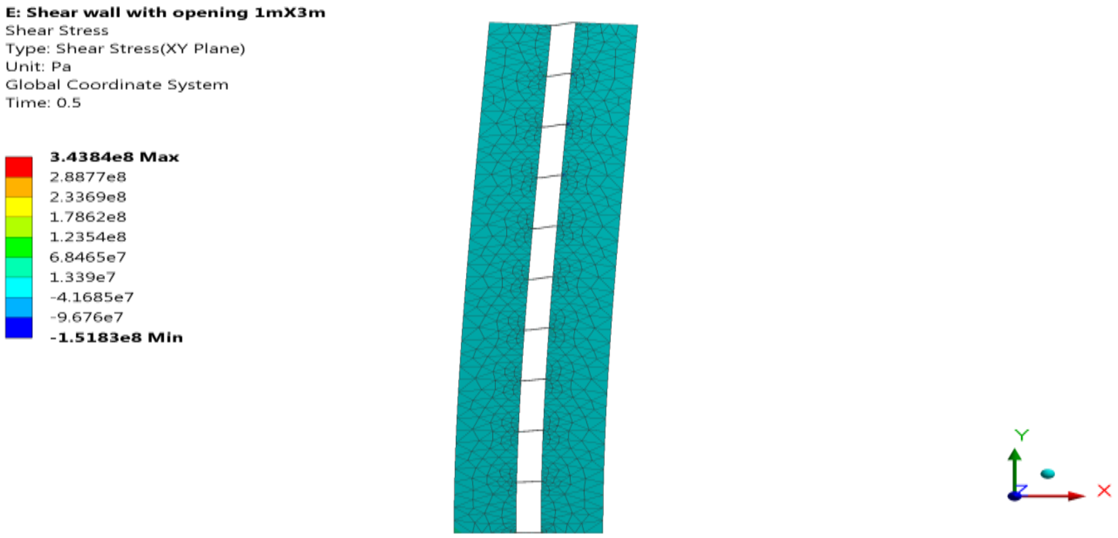


Fig.

Fig. 13 Shear Stress in 1m x 3m Opening shear wall.

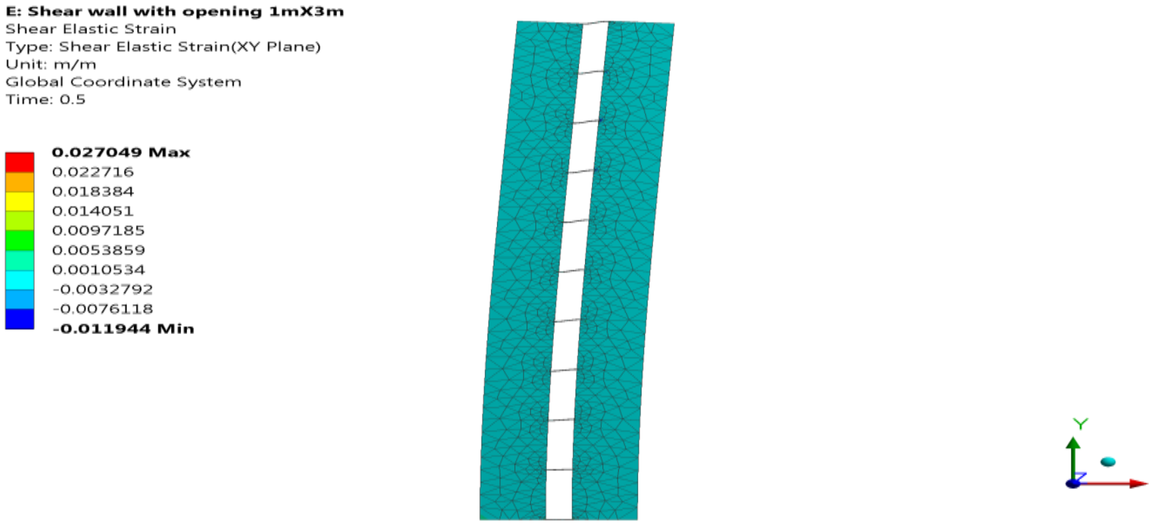
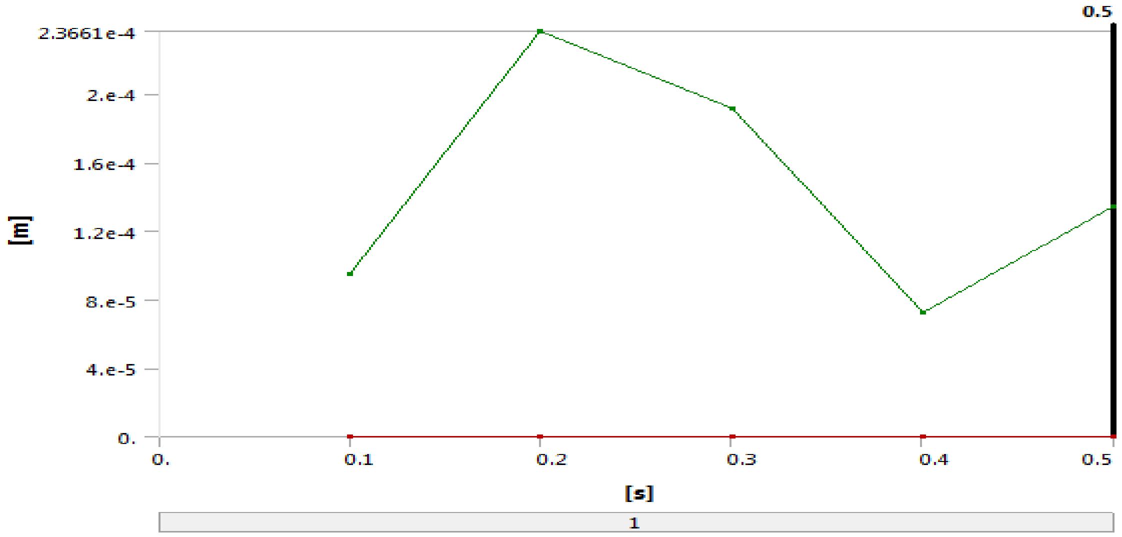


Fig .14 Shear Strain in 1m x 3m Opening shear wall.



Graph .10 Deformation on cycling and varying load in 1m x 3m Opening shear wall.

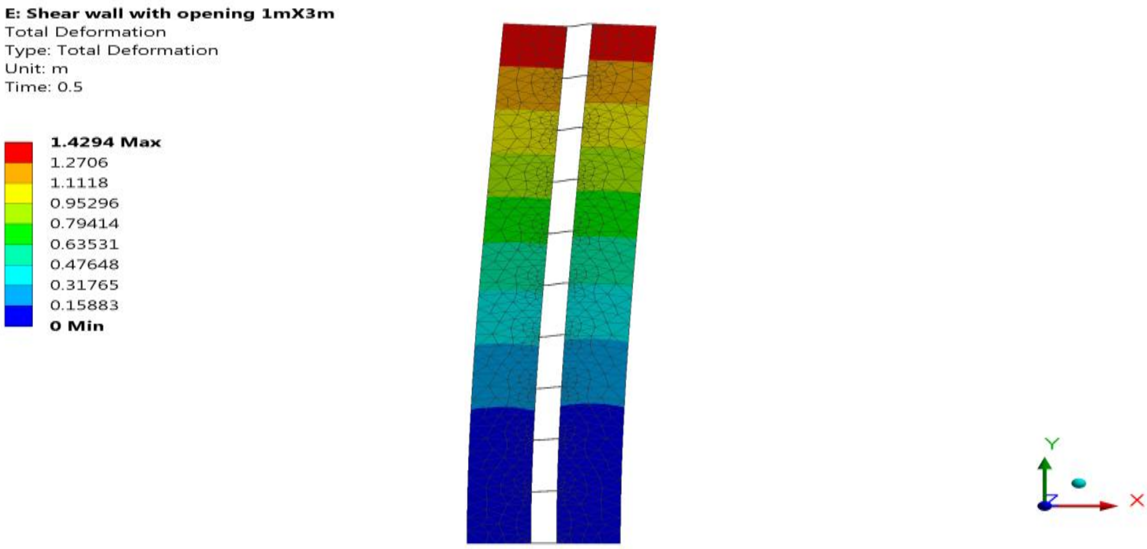


Fig. 15 Total deformation in 1m x 3m Opening shear wall.

CONCLUSION

- The larger size of the opening is greater than the stress flow disturbance within the shear wall. When opening is greater than the stress flow disturbsance within the the shear wall. when opening are large enough ,the load ability hold or do something is reduced in the study at 1m×3m open size the load ability to hold or do something went down to about 75% of that of a solid shear wall.
- In case of solid shear wall, the first cracking happen at seprate location close to base of the wall in the areas where the concrete related to stretching wire etc. When the opening size gose beyond that of small opening first cracking start at location close to base of the wall and also appears at the opposite of the corner of the opening.
- When the opening are largest first cracking start at joint between upper lintel of opening and side wall as show in this experiment if frame has height and width ratio less than 4:1 or 5:2 based on the analysis and discussion , shear wall is very good for resisting earthquake cause lateral force in multistorey building .
- Small opening yield minor effect on the load ability to hold or do something of shear wall, flexural stress along base level of shear walls behave as coupled shear wall.

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BIOGRAPHY

B.TECH FROM AKTU LUCKNOW
PROJECT ON MULTI STOREY BUILDING
M.TECH FROM SHUATS PRAYAGRAJ INDIA