COMPARATIVE STUDY ABOUT DIAGRID VS CONVENTIONAL BUILDING

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ABSTRACT

In contemporary days due to the decrease of availability of limitation land with increase of land cost with the rapid increase of land cost along with the rapid growth of population density. To overcome from the above problem the architect and civil engineer are focused toward to the construction of tall building.This paper shows the comparison between diagrid and the conventional building behaviour recently diagrid structure system is adopted in tall building due to structural efficiency and flexibility compared to the conventional building system. The building area lies about 324m^2 with the height of 48m, with the base area 16x16m, the simulation of diagrid and the conventional building analysis are done in Etabs v.17.0.1

Keyword*: diagrid, conventional, Etabs*

1.NTRODUCTION

The modelling and the analysis of the building both the diagrid system as well as the conventional building, it deals with the detail building specification and the material specification and load consideration are explained below.

1.1BUILDING SPECIFICATION: The diagrid building configuration are tabulated below.

Building Area	324m^2
Building height	48m
Ground floor height	3m
Typical floor height	3m
No of floors	G+16
Plan of the building	16x16m
System	Diagrid
Diagrid design angle	65°
conventional design angle	90°

1.2ASPECT RATIO:

The aspect ratio of the diagrid system is evaluated by using the formula

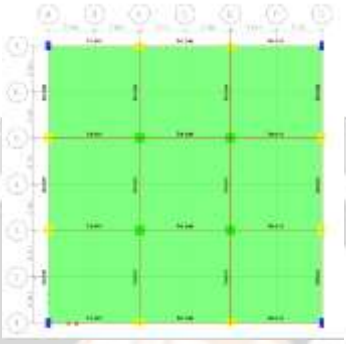
Aspect ratio= $\tan^{-1}(H/B)$

Where, H=height of the building

B= base dimension of the building

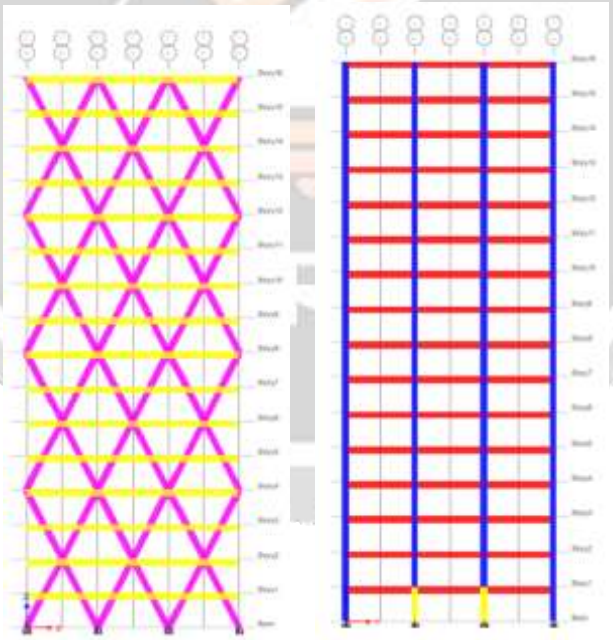
1.3 PLAN

Master Story L00



Diagrid Pattern and conventional pattern

- The diagrid Pattern and the material specification are same for all the left, right, front and rear elevation where as the conventional pattern are same in all sides



Diagrid conventional

Building pattern

1.4LOADS AND LOAD CONSIDERATION

LOAD	**CODE USED**
Dead load	Program calculated
Superimposed load	IS-875 (part-1)-1987
Live load	IS-875 (part-2)-1987
wind load	IS-875 (part-3)-2015
seismic load	IS 1893-2016

Self-weight is calculated as per on Indian standard IS-875. The dead load of the structure calculated automatically by Etabs, as per as IS-875 part2 the superimposed load shall be calculated based on the classification following live load consider.

1.5 WIND LOAD:

Factor	**Value**
Zone (z)	III
Importance factor(I)	1.5
Response reduction factor (R)	4
Fundamental period (Ta)	0.09H/√D
Soil classification	I

1.6 ASEISMIC LOAD

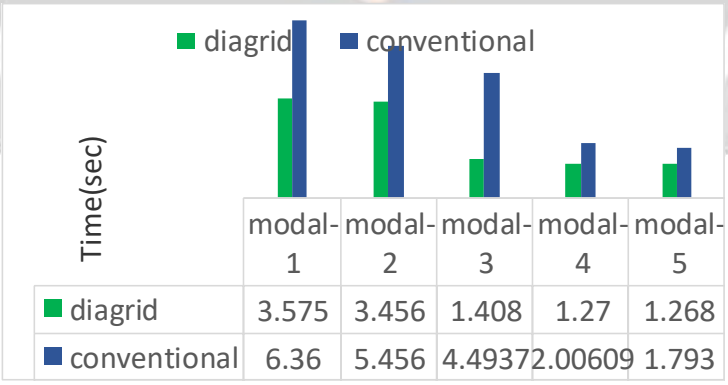
Factor	**Value**
Basic wind speed	50
Life	100yrs
Risk factor(K1)	1.08
Terrain factor (K3)	1
Important factor(k4)	1.3

2RESULT AND DISCUSSION:

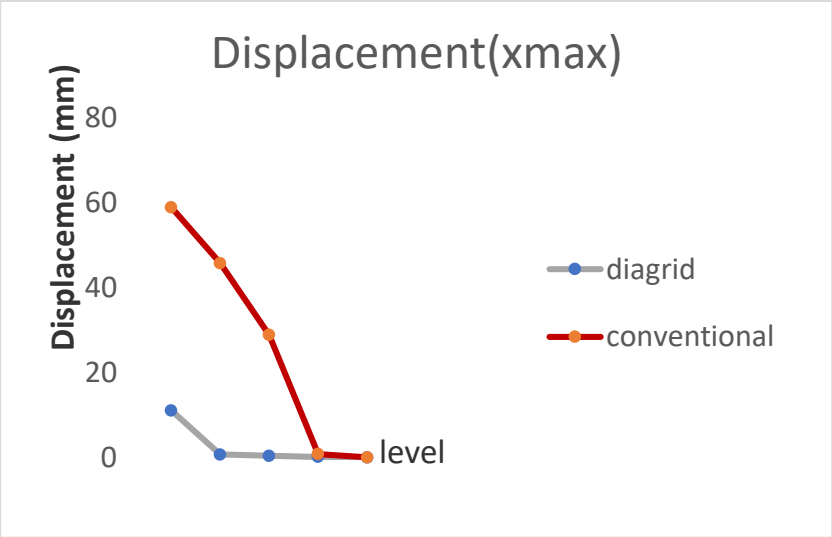
observation	diagrid	conventional
time period	1.046 (sec)	3.084(sec)
displacement (xmax)	11.0117mm	59mm
displacement (ymax)	11.4 mm	47 mm
drift (xmmax)	0.0064	0.01279
drift (ymax)	0.0062	0.010603
drift(wind-x)	0.0025	0.0038
drift (wind-y)	0.000206	0.000437
displacement(wind-x)	58.61	69.38
displacement (wind-y)	58.92	68.14

The result and discussion of the present parameter disclosed above are due to lateral load as the tall building are the critical under the lateral loading,

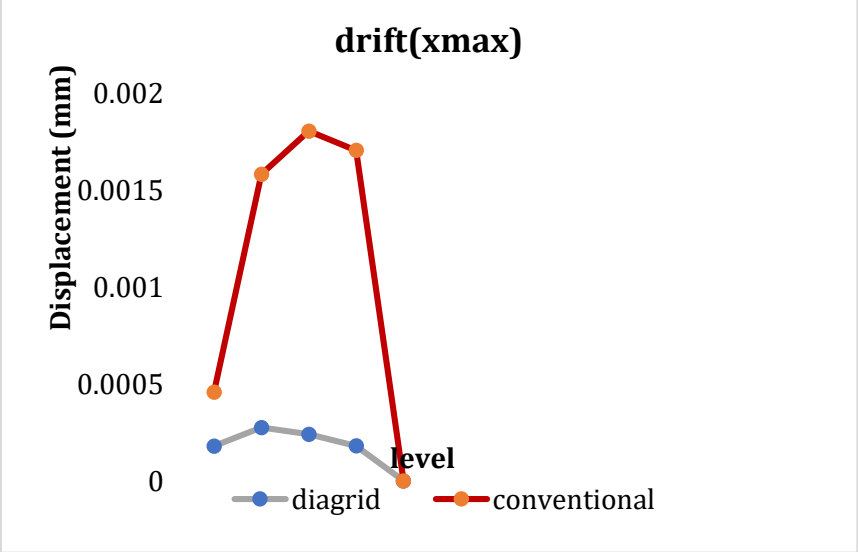
2.1Time period: The modal time period of the diagrid and the conventional building are shows below in the chart representation.



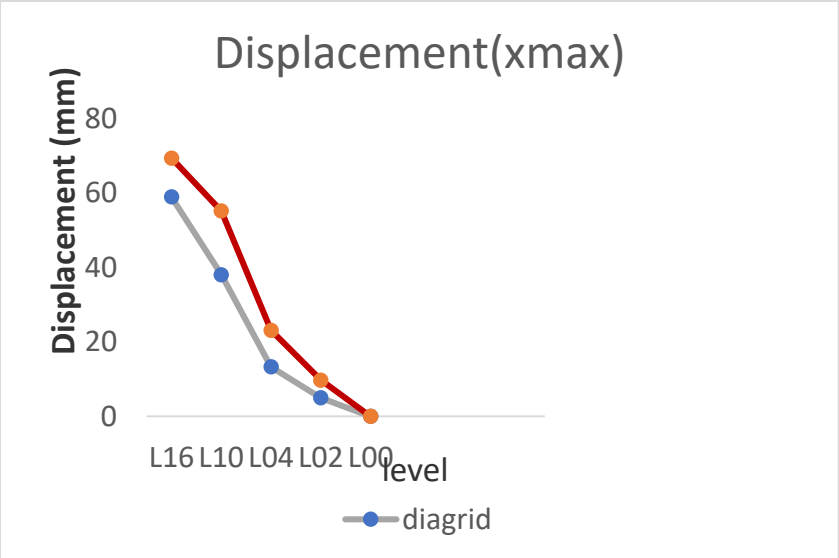
2.1Displacement for seismic condition:



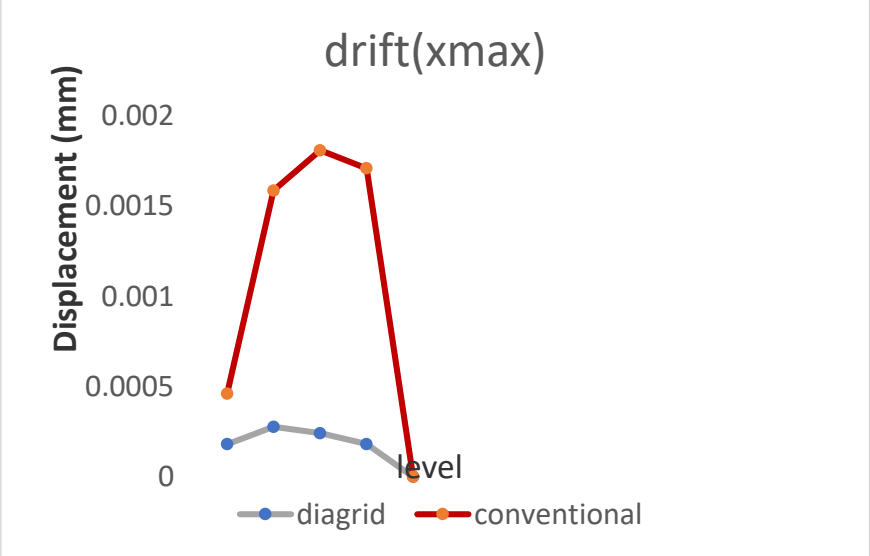
2.2Drift for seismic condition:



2.3Displacement for wind condition:



2.4 drift for wind condition



3. CONCLUSIONS

1)It was found that from analysis result the time period, max story displacement and the story drift of the diagrid building system is less compared to the conventional building system.
2)Diagrid system is significantly efficient lateral load resisting system when compared to conventional building system.
3)In diagrid structure is major task of fabrication of joint is complicated compared to the conventional building.
4)Whereas the time period ratio between the conventional and diagrid is lies 0.562.
5)The displacement ratio under the seismic load condition is around the range of 0.15 to 0.22 Along the x-axis and y-axis
6)The displacement ratio under the wind load condition is around the range of 0.48-0.58 along the x and y direction of wind flows.
7)It was observed that the diagrid system is more effectively resist the earthquake load compared to the conventional building system.

8)The difference between the diagrid and the conventional building base story shear lies around 0.39. it was observed that the diagrid as less base shear compared to the conventional building structure.
9)It was observed that the diagrid structure has high cost valuation compared to the conventional building.

REFERENCES

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4)Indian standard code of practice for design load (other than earthquake) for building and structure part-1 dead load Is(875-part3) 2015, bureau of Indian standard
5)IS 800-2007 Indian standard code for general construction in steel for practice, bureau of Indian standard
6)European steel table, European wide flange beam
7)BS:5950-2001: part-2 specification for material fabrication and eraction.