A Review Paper on Evaluation of seismic behavior of Reinforced Concrete-steel Composite framed building

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***Abstract*—Most of the buildings are made up of RCC frame building. In addition to vertical loads, it is a great importance to design the buildings against lateral load produced due to wind, earthquake. The large social and economic impacts of recent earthquakes in the world have resulted in an increased awareness of the potential seismic hazard and the corresponding vulnerability of existing structures. Greater effort has been given to reasonable estimates, predictions and mitigation of the risks associated with this potential loss. In the present study, the seismic behavior on RC frame building and RC- steel composite frame building is carried out. For this purpose, linear analysis of RC-steel composite frame building and regular frame structure building has been carried out. The comparison is made based on base shear between RC framed building and RC-steel composite framed building. It is found that RC- steel composite structure has low base shear which will result in economical foundation design as well as RC-steel composite frame building has more ductility compared to conventional RC framed structure. Also, linear analysis of RC frame building and RC-steel frame building for G+4 storied structure and G+9 storied structure is carried out and compared both structure on the basis of cost.**

***INDEX TERMS* - Multi- Storey Building, Seismic Analysis, Storey Displacement, Storey Drift, Base Shear.**

INTRODUCTION

Construction activity is an integral part of infrastructure and industrial development of the anycountry. India is the fastest growing country across the world. In most of cities of India expenditure of land is huge so there is obstruction of horizontal development of building and we have only option is vertical expansion of building. Generally, in India reinforced concrete structures arewidely used for low rise building because it is economical and easy for construction. However,as height of structure increasing from medium to high rise the reinforced concrete structure is no longer economical also it is not easy for construction. As building elevates by each floor,mass of building rises, overall stiffness of building reduces and natural period of a building also enhances. Also, there is restriction on span length and formwork is also hazardous. So there is lot of challenges for effective and economic design of structure in front of structural engineers. For medium to high rise structure steel and concrete composite structure is common solution.

Innovative composite frame systems have developed in tall building design whereby structuralsteel and reinforced concrete have been combined to produce a building having the advantagesof each material. The use of these systems has advantages of both– i.e., the inherent mass, economy of reinforced-concrete and the speed of construction, long span capability, and light weight of structural steel.

OBJECTIVES

- To model and perform analysis of RCS and RC frame in software.
- To check Seismic performance of Reinforced Concrete steel (RCS) composite building and RC frame building.
- To suggest excellent effective arrangement enhancing seismic behavior of RCS building.
- To study cost comparison between RC frame structure and RCS composite frame.

LITERATURE REVIEW

Bahman Farahmand Azar, Hosein Ghaffarzadesh and Nima Talebian [1]

In the show's seismic performance of RCC column and Steel beam composite frames based on FEMA-356. Plastic rotation is the acceptance criteria. In this paper the effect of the joint deformation on overall behavior of RCS joint is studied. For evaluation of seismic performance nonlinear static analysis is used. Three regular RCS frames with three bays are first designed using ETABS software by considering joints are rigid. In the end RC frames are compared to RCS frames and influence of steel beam on lateral load capacity is studied.

Prof. Rajendra R. Bhoir, Prof. Vinay Kamble, Prof. Darshana Ghankute [2]

In they have analysed and designed two residential G+15 storied composite frame structure and RCC frame structure with two different storey heights 3m and 4m. the 3D building models are analyzed using equivalent static method for same specification and loading. The building models are analyzed on ETABS software. And parameters such as shear force, axial force and bending moment are studied for the models. The cost analysis carried for RC frame structure and composite frame structure.

D.R.Panchal, P.M.Mara [3]
In the study is carried out on RCC, steel, composite frame structure. For analysis G+30 storied commercial building is considered situated in eathquake zone IV. The analysis is carried out using equivalent static method. Also elements of composite are briefly discussed. In the study includes deflection of members, size and quantity of material of composite structure with respect to RCC and steel structure. The seismic behaviour of buildings are studied for different parameters. Also in study foundation type and foundation requirement is discussed. For analysis ETABS software is used.

M.C.Arun Prasad, Mrs. V. [4]
In this, G+9 multistoried building is modelled and analyzed under seismic zone 3 and zone 4. The analysis is carried on ETABS software. For study 3 different type frame structures are modelled. One for conventional RCC frame structure and other two different column types one for concrete filled hot rolled steel tube and other for concrete encased Isection. The seismic analysis carrie parameters such as max storey displacement, d out under zone 3 and zone 4 for max storey drift and base shear and results are discussed.

Mohammed Imran, Shaik abdulla, S.M.Hasmi [5]
In this G+12, G+18 in (5) has executed seismic analysis of G+6, with shear wall and without shear wall for conventional frame structure and composite frame structure. Response spectrum method preffered for analysis. For modelling and analysis ETABS software is used. Comparison is made on various parametes such as b ase shear, column axial forces, and beam moments.

Shweta A. Wagh, Dr. U.P.Waghe [6]
In this commercial buildings i.e., G+1 in (5) this, they have studied, four various multistoried 2, G+16, G+20, G+24. Analysis is carried out STAAD Pro software and design is in MS Excel programming. Analysis is carried out and parameters such as maximum storey displacement, shear force in Xdirection, bending moment in Zare discussed for b direction oth RCC and composite frame structure. Also Comparison is made between conventional RCC frame structure and Composite frame structure on the basis of cost.

Gregory G. Deierlein, F.ASCE, and Hiroshi Noghchi, M.ASCE [7]
In this it has carried out research on reiforced concrete and steel moment frame structures. It includes test an d analysis over 50 composite beam column connection, test and analysis of two composite frames, and performance based seismic design and simulation studies of prototype composite frame building. This paper gives brief idea about composite frame have great seismic deformation capacity along with toughness comparable to traditional steel or RC construction.

Anamika tedia, Dr. Savita maru [8]
In this crried out study of G+5 storey office building with 3.658 m. height situated under earthquake zone III and win d speed of 50 m/s. for modelling and analysis STAAD Pro software is used. Anlysis is done by using equivalent static method.

Mohd Amir Khan [9]
In(8) has carried out linear and non linear analysis on convention RC frame structure and composite frame structure . For modeling and analysis ETABS software is used. For analysis two 33.5 m buildings are considered. Plan area is 240 sq.m. for equivalent static method is preferred for seismic analysis. pushover analysis is executed. Comparison is made on the basis of various parameters such as maximum storey displacement due to earthquake and due to wind, maximum storey drift, base shear and overturning moment.

Sairaj P., Padmanabham K. [10]
This paper gives idea about economical parameters of G+4 storied structure planned by braced frame of composite construction. of braced frame model s are developed. In analysis of geographic models various types of Equivalent static method of seismic analysis reffered and the results are matched with STRAP software. This study tries to make and enhance efficient geometric models for newly developed constructions, and gives required structural arrangements against retrofitting of the current structures, constructed in seismic prone regions .

METHODOLOGY

- Collection of required data to carry out the analysis from journals, technical magazines reference books and web source.
- Preparation of basic models of RCC Structures and RC Steel composite Structures with alternative arrangement based on software. To evaluate linear statics analysis of models.
- To study seismic behavior of RCC and RC Steel framed models in terms of parameters such as Maximum displacement , Storey drift and Base shear.
- Comparison to be made between these analysis to known seismic behavior of RCC and RC Steel framed models.
- To study behavior of RCC and RC Steel composite framed structures with alternative arrangements.
- From the results of analysis the final conclusion will draw.

CONCLUSION

Many of study shows that, conventional RCC building produces very huge amount of bulk unit weight which may results into uneconomical conditions by cost as well as by efficiency parameters such as deflection ,overturning etc. in static analysis and storey displacement, storey drift, base shear etc. in dynamic analysis. To overcome above problem many of studies had carried outs such as bracing system, shear wall analysis etc. which may helpful in reducing dynamic parameters such as storey displacement, storey drift, base shear etc.

RCC-Steel composite building is an advanced technology which may most effective among all described methodologies in seismic analysis of multi storey building in high risk zones of seismicity and reduces storey displacement, storey drift, base shear by considerably also results into low cost as compared to conventional RCC multistorey building.

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