Review on Structural Failure Prediction of Multistoried RC Building

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Abstract-Reinforced concrete is a combination of concrete and steel plates which enhance the strength of the concrete. This type of concrete is able to resist the applied force together. The combination of steel and concrete gives effective strength and able to handle the largest vibrations of earthquakes, winds and other forces. Basically it is and economic building material which is used now the days in most of the building construction. It is used in construction of beams, columns and storage structure like dams, tunnels and water tanks.

Keywords- beam, rcc, prediction

I. INTRODUCTION

Reinforced concrete structures are basically built with concrete being reinforced with steel reinforcement. Concrete is weak in tension, thus to make up for it, steel reinforcement is added to the member, thus resulting in formation of reinforced cement concrete structures. Thus concrete is strengthened both in tension and compressions. It is this property of reinforced concrete structures that lets the designersbuild limitless structures, pushing every boundary that existed earlier. This has resulted in vast expanse in construction of dams, bridges, buildings, water tanks, shell structures etc.

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II. ISSUES IN RC BUILDINGS

1. Sliding of roofs off the supports
2. Falling of infill walls.
3. Crushing of column ends and virtual hinging.
4. Diagonal cracking in columns
5. Collapse of gable frames.
6. Foundation sinking and Tilting

III. RELATED STUDY

Xu, Long-He et al. [1]Back Propagation algorithm is proposed for the seismic performance optimization in RC buildings. The sensitive seismic components are identified by updating the weighting coefficient. In this validation of the model is done by using SCED (self-centric energy dissipation) braces. The proposed back propagation method improves the seismic performance effectively in RC and steel frames. Yu, Jun, et al. [2]worked on the numerical models which is based on the solid element for study the reasons of progressive collapse in RC bean slab substructures. This RC structure is mainly used in monolithic construction. The structural resistance in slabs is increased by membrane and composite effects. The parameters studied in this work include the lateral restraint stiffness at the boundaries. The simulation result of the proposed methodology shows its effectiveness.

Polimeno, Maria Rita, et al [3]formulated a new approach for on field inspection of RC buildings by using non-destructive testing method. The experiment is performed on the shaking tables. At columns high correlation is found between the ultrasonic velocities and RID. Ultrasonic tomography is used for virtual mapping of columns sections damage. Vitiello, U., et al. [4] proposed RC structures forlifecycle cost optimization of the seismic retrofit. Semi-probabilistic method is developed to evaluate the economic performance of a building prone to seismic risk. The goal of this work is to identify the strengthening strategy for cost effective model. Structural and non-structural component is used to divide a building

Chatterjee, Sankhadeep, et al. [5]In this paper, the author proposed particle swarm optimization model with neural network for the prediction of structural failure prediction in multistoried buildings. In this work weight vector is calculated by using PSO algorithm with minimum RMSE value. It detects the failure by detecting failure possibility. In this work PSO gives the optimal weights to the neural network classifier. The result evaluation is done on the fifteen buildings and it gives good accuracy in prediction. Choi, Se Woon et al. [6] Multi-objective optimization method is proposed for RC frames in the buildings. This work presented optimal retrofit method using fiber reinforced polymer jackets and to investigate the distributions of positions. To achieve the economic feasibility it's reduce the amount of FRP and maximizes the spectral acceleration of ground motion. This

process reduces the risk of collapse. The proposed method is tested on the 3 story building and differentiates the retrofit level according to the retrofit positions are proposed by optimal solutions.

Hore, Sirshendu, et al. [7] introduced the feed-forward neural network to detect the failure possibilities of the multi-storied RC buildings. In this work reinforcements in the beams are designed for flexure and shear force with the length of beam which is based on the structural analysis. At last this beam is tested for serviceability and safety against the collapse. The performance evaluation is done by using the standard metrics and result determines the effectiveness in RC buildings.

Zhang, et al. [8] formulated a beam-column joint element for the analysis of RC frame structures. It considers the shear formation and bar slip behavior was proposed. The proposed joint element is tested on the dataset of RC frame. This method is used to predict the mechanical behavior of structures and their components. The proposed method reduces the energy dissipation and ductility of the structure.

Weerheijm et al. [9] discussed the dynamic response and progressive collapse in the multi-storied RC buildings. In this different models are used to identify the collapse between the buildings. It detects the failure by detecting failure possibility.

Saadat, Sanaz, et al. [10] proposed a performance based design which optimized the structural and non-structural system performance and seismic losses. This method is used to optimize the steel structure buildings. This method reduces the initial construction cost of the structural system. Multi-objective optimization is done by using genetic algorithm and solves the optimization problem. Damage probabilities of the structural system and non-structural system are obtained by using Hazus fragility functions.

IV. INFERENCES FROM THE LITERATURE REVIEW

Author's Name	Year	Method/technology/ Algorithm Used	Outcomes
Xu et al.	2018	Back Propagation based Optimization	• Proposed method is used to improve the seismic performance of the RC buildings. • Back propagation method works on modifying the weighting coefficient. • It gives optimized results without any enhancement is cost.
Yu Jun et al.	2018	Perimeter column removal	• Numerical model provides the high fidelity which is based n solid element. • Studied the progressive collapse resistance in the RC beams.
Polimeno et al.	2018	Non-Destructive Testing	• The purposed work is tested by using shaking table test. • Correlation between ultrasonic velocity and RID is high and found at columns.
Vitielio et al.	2017	Cost optimization of RC Building	• Identify the cost effective strengthening in structural lifetime of building. • Fiber reinforced polymer strengthening of element in RC columns.
Chatterjee et al.	2017	Particle Swarm Optimization	• PSO algorithm is used for the optimization with neural network. • All the work is based on the weight vector which is calculated with root mean square error. • PSO selects the optimal weight for effective optimization. • This approach gives effective accuracy and precision of prediction.

Choi et al.	2017	Multi-Objective Optimization	• Proposed retrofit seismic method and used with fiber reinforced polymer jackets. • Worked on two objective functions that are FRP reinforcement and spectral acceleration of ground and maximize it.
Horeetal.	2016	Neural Network	• Uses Multi-layer Perceptron feed forward network classifier to tackle the problem of prediction in the RC buildings. • Classification of features approach is used for effective prediction results.

V. CONCLUSION

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