“Seismic Assessment of a Historical Masonry Structure using ETABS: A Review”

Rashmi Sakalle1, Mohanlal ahirwar2
Asso. Prof.1, P.G. Scholar2

Department of Civil engineering, Truba Institute of Engineering and Information Technology Bhopal, M.P.

Abstract:

It is well known fact that un-reinforced masonry structures are the most vulnerable during an earthquake. Normally URM buildings are designed for vertical loads and since masonry has adequate compressive strength, the structures behave well as long as the loads are vertical. When such masonry structure is subjected to lateral inertial loads during an earthquake, the walls develop shear and flexural stresses. The strength of masonry under these conditions often depends on the bonding between brick and mortar which is rather poor. This bond is also very poor when lime mortars or mud mortars are used.

In this paper we are presenting literature survey of authors related to assessment of masonry structure.

Keywords: Masonry structure, Assessment, Historical building, rani mahal, analysis, forces, moment.

Introduction:

Masonry is the oldest building material that still finds wide use in today’s building industries. The most important characteristic of masonry construction is its simplicity. Laying pieces of stone, bricks, or blocks on top of each other, either with or without
cohesion via mortar, is a simple, though adequate, technique that has been successfully used ever since remote ages. Naturally, innumerable variations of masonry materials, techniques, and applications occurred during the course of time. The influence factors were mainly the local culture and wealth, the knowledge of materials and tools, the availability of material, and architectural reasons.

The primitive savage endeavors of mankind to secure protection against the elements and from attack included seeking shelter in rock caves, learning how to build tents of bark, skins, turfs, brushwood and huts of wattle and daub. Some of such types crystallized into houses of stone, clay, or timber. The evolution of mankind is thus linked to the history of building materials.

The thorough review of literatures associated to seismic analysis of masonry buildings is a very vast area. This literature review emphasizes the brief assessment of the seismic analysis of masonry structures.

**Rashmi Sakaleet. al. (2018)** here the author's research work was based on examining the seismic the vulnerability of a particular monumental masonry building: RANI MAHAL, at Islam Nagar in Bhopal, M.P (India). The seismic behaviour was assessed by the equivalent static analysis, as indicated by IS 1893:2002(PART-1). Design of base shear for the palace with the data available after visual inspection of the palace determines the seismic strength/shortcoming of this sort of building to endure broad harm under earthquakes. The need for examining the structural behaviour can further permit the identification of an appropriate retrofitting procedure if any harm is caused to the building by seismic tremors during its lifetime.
The obtained results led to conclude that based on the equivalent earthquake analysis, it was observed that the building was performing at the level of life safety under zone II due to heavy stone foundation and Base shear was equally distributed in the building, hence performance of the building under lateral forces were in an acceptable limit.

**Michele Betti, Luciano Galano (2015)** here the author introduced an examination between two numerical demonstrating approaches utilized to explore the seismic conduct of unreinforced brickwork structures with adaptable stomachs. Here the examinations result featured that the FE model was equipped for repeating with great certainty the exploratory harms and concluded that the seismic investigation of customary brickwork structures (with adaptable floors and poor associations between the dividers) ought to be analyzed through a cross-numerical methodology.

**Ana María García Gamallo (2003)** the essential goal of the paper was to depict the ordered advancement of the conventional kinds of structure establishment utilized in structures built inside the outskirts of the previous European areas of the Roman Empire, amid the timeframe crossing from the presence of the first of these sorts of establishments up to the beginning of the main Industrial Revolution. Notwithstanding, that in this equivalent period saw an improvement in the structure methods utilized for establishments, connected mainly to the need to determine issues emerging from the development of structures of certain significance on poor ground.

**Murat Saatcioglu and Jag Mohan Humar (2005)** here the author gave a diagram of dynamic examination methods for use in seismic plan, with statements on scientific displaying of structures, auxiliary components, and hysteretic reaction. This was
particularly valid for flexure-prevailing structures where the hysteretic reaction was commanded by balanced stable hysteresis circles, a component that was tended to by most of the accessible PC programming. As a rule, it was adequate to examine these structures with the utilization of an elastoplastic model for steel structures and a solidity debasing model for strengthened solid structures. Extraordinary consideration ought to be worked out, be that as it may, to ensure that the registered reaction could be accomplished with the plan and enumerating rehearses utilized.

P. Gülkan1 and S. T.Wasti (2009) here the author's paper exhibited examined the difficulties presented by, and arrangements required, to guarantee the basic life span of notable structures. Contextual analyses were portrayed where standards expressed with regards to accomplishing life span for antiquated landmarks had been actualized. Here the author presumed that the danger of future tremors and different catastrophes will guarantee that in each nation and locale consideration will be given in the coming a long time to the retrofitting of noteworthy structures. Such great structures are a solid notice of the wonders of the human past in a world that is contracting as far as reality. National pride will, gradually however unavoidably, be deciphered as a piece of all worldwide accomplishment.

Ariful Islam et. al.(2011) here the essential goal behind the author's investigation was to assess the tremor safe conduct and evaluate the seismic helplessness of brickwork frameworks. The fundamental ends got from the investigation of the general auxiliary conduct of stonework incorporated that Masonry dividers ought to be looked at forof-plane criteria dependent on their (h/t) proportion. This was constantly the weakest connection in their seismic opposition, due to precariousness caused because of the vast
upsetting minutes from parallel burdens like a tremor. Divider openings definitely diminished the firmness and sidelong burden conveying capacity of unreinforced workmanship structures. Actually, extremely expansive dividers that were required to convey critical horizontal burdens are rendered exceptionally feeble and powerless because of the substantial window and entryway openings and Closely-separated divider openings and the ones excessively near divider limit are entirely helpless against seismic tremor harm.

**Lynnet. al. (2001)** here the author's examination explored the horizontal and vertical burden opposing conduct of fortified solid segments run of the mill of pre-1970s development. Eight full-scale examples were developed and were stacked with steady hub load and expanding cyclic sidelong removal increases until disappointment. Test information was given and thought about conduct assessed by utilizing different assessment strategies. Shear qualities were contrasted and determined shear qualities utilizing the systems expressed by rules. In spite of the fact that various methods had a generally close normal connection to test results (normal proportions of exploratory to determined shear quality of 0.98), the standard deviations of the different strategies never came nearer than 0.22, demonstrating moderate dissipate, best case scenario.

**Maria Basdeki and Argyro Drakakaki (2018)** here the author introduced a test method, concerning an RC segment before and after corrosion. An estimation concerning the drop of its mechanical execution has occurred, showing the significance of the consumption factor. Also, a current brickwork tower building was exposed to seismic assessment. Both OASP and EC2 examination techniques were utilized. The outcomes called attention to that, for medium– force seismic tremors, both logical and rough techniques are good and
dependable. The technique for OASP does not consider the genuine mechanical properties of the stonework, because of the absence of exploratory testings. Consequently, Young's modulus of versatility significantly affects the technique, while a conceivable decrease of it prompts a noteworthy increment of the deficiency list of the structure as indicated by EC8. In this way, deficiency record as indicated by EC8 are moderate in contrast with those as per OASP and Greater intermingling of the two techniques could be seen for qualities bigger than 1.5 of the conduct factor.

**Gabriele Milaniet. al.(2007)** here the author went for an increasingly broad system, a micromechanical model grew already by the writers for the point of confinement investigation of secluded all through plane stacked stonework dividers is stretched out here and used within the sight of coupled layer and flexural impacts. The primary ends got from the examination was that that: (a) the proposed methodology enables us to acquire disappointment components and breakdown loads, gives comparable outcomes to increasingly complex methodologies dependent on nonlinear additions and iterative limited component recreations. The outcomes are acquired for a little part of the exertion when contrasted with nonlinear reproductions. The most extreme handling time of the proposed methodology for the models appeared in the present paper does not surpass 150 s; (b) the affectability examination completed demonstrates that diverse overwhelming disappointment instruments can be gotten in the investigation after a moderate change in the material parameters. In this manner, the noteworthy alert is prescribed when endeavouring to repeat existing harm designs in existing stonework structures utilizing progressed nonlinear reproductions.

**Conclusion:**
No detailed study on non-linear analysis of masonry structure and related techniques such as analysis tools has been done in past researches were conducted on different existing structures or monumental buildings built up of steel, rc and brick masonry materials.

References:


