

# Analysis of A Storage Tank Considering Lateral Forces: A Review

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**Abstract-** Water tanks are used to storing the water for future use like commercial and domestic and water tanks are used since orient times for the purpose of storage of water and various resources. Therefore, this project deals with the optimum working of RCC water Tank and Fluro Polymer water tanks.

Elevated water tanks are one of the most significant help structures in seismic tremor inclined locales. Insignificant urban communities and furthermore in provincial territories raised water tanks frames a fundamental piece of the water gracefully conspire. These structures have enormous mass amassed at the highest point of supporting structure thus these structures are particularly helpless against level powers because of tremor. Raised water tanks that are insufficiently damage and planned have endured broad harm during past quakes. The raised water tanks must stay practical much after the quakes as water tanks are required to give water to drinking and putting out fires reason. Subsequently, it is essential to check the seriousness of these powers for a specific locale.

In this paper we are presenting review of researches related to analysis and design of storage tanks using different analysis method and fill conditions.

**Keywords-** Analysis, structure, water, storage, lateral forces, material.

## I. INTRODUCTION

The elevated water tank is one of the most significant structures in a seismic tremor occasion. The elevated water tank is developed for holding water at a specific stature to pressurize the water dissemination framework. In case of an earthquake, raised water tanks were vigorously harmed or fell during the tremor. Because of the high affectability of the raised water tanks to the quake qualities, for example, top ground quickening, recurrence substance and the length of seismic tremor records.

The strengthened concrete solid overhead water putting away tank is the best putting away office utilized for residential and in any event, for modern purposes. The water is a significant wellspring of each creation. In everyday life, one can't live without water. The underlying motivation behind fortified concrete solid overhead water tank is to protect perpetual gracefully of water with the adequate stream to a bigger territory by gravity and this capacity to keep performing considerably after its hit by seismic tremors, so persistent flexibly of the water is made accessible in quake influenced territories.

A water tower likewise fills in as a store to help with water needs during top use times. A water tower is a raised structure supporting a water tank built at tallness adequate to pressurize a water flexibly framework for the circulation of consumable water and to give crisis stockpiling to fire assurance. In certain spots, the term standpipe is utilized conversely to allude to a water tower particularly one with tall and restricted extents. Water towers can gracefully water in any event, during forces blackouts since they depend on hydrostatic weight delivered a rise of water (because of gravity) to drive the water into residential and mechanical water dispersion frameworks.

In this literature survey we are presenting some of the works done in past related to lateral load resisting techniques, there positive and negative impacts. Detailed study of each literature paper has been put to justify the scope and present development in the field of resisting members.

**James Gardiner et. al. (2015)**the exploration paper introduced production, properties of fluoropolymer including the recorded advancement of the fluoropolymer business, with attention on conventional fluoroplastics, and records the major mechanical and business materials right now being used. These incorporate polytetrafluoroethylene (PTFE, Teflon), polychlorotrifluoroethylene (PCTFE), fluorinated ethylene propylene (FEP), the ethylene copolymer of tetrafluoroethylene (ETFE), the ethylene copolymer of chlorotrifluoroethylene (ECTFE), perfluoroalkoxy (PFA), polyvinyl fluoride (PVF), polyvinyl difluoride (PVDF),

Nafion, fluoroethylene vinyl ether (FEVE), a semicrystalline three-segment terpolymer of tetrafluoroethylene, hexafluoropropylene, and vinylidene fluoride (THV), Teflon-AF, Cytop, and Hyflon.

The conclusion expressed that the rule properties of latent concoction sturdiness, water and stain opposition, high toughness, along with upgraded optical and electronic properties have made fluoropolymers the favoured material for some master applications. Fluoroplastics rule the fluoropolymer business with PTFE still at the front line of production and use. The fluoropolymer showcase was expanding at a consistent pace of 5–8% every year. Further interest will squeeze sourcing of crude materials (for example fluorspar) making further rivalry with the worldwide steel, aluminium, and manure enterprises.

**Jiandong Yang et. al. (2016)** the aim the research paper was to adopt a 1D numerical simulation method so as to establish a mathematical model of a surge tank ventilation tunnel” system and to derive a wind speed simulation method. Thereafter, from the perspective of wave superposition, the effective mechanism of water-level fluctuations in a surge tank and the shape of the ventilation tunnel for onward distribution and the wind speed change processes are discovered.

The conclusion derived from the research paper stated that the proposed one-dimensional simulation method could be used to accurately simulate the wind speed in the ventilation tunnel of a surge tank during transient processes. The fluctuation in wind speed can be superimposed by using the low frequency fundamental waves as well as the high frequency harmonic waves. The fundamental waves can be derived by using the water-level fluctuation in a surge tank. The fundamental wave corresponds to the mass wave; its period was equal to the period of the water-level fluctuation in a surge tank and its amplitude was influenced by the water-level fluctuation speed and the mass flow in the ventilation tunnel. The harmonic wave corresponds to the elasticity wave; its period ( $4L/B$ ) was proportional to the length and its amplitude was proportional to the gas inertia in the ventilation tunnel. The amplitude of a harmonic wave increases gradually from the first section (i.e., the first section is zero) to the last section along the axis and gradually decreases over time. The water-level fluctuation in a surge tank and the sectional area of the ventilation tunnel greatly affect the amplitude of the fundamental and harmonic waves. The period of a fundamental wave can be determined by using the water-level fluctuation. The ventilation tunnel length can be used to greatly affect the period and amplitude of harmonic waves, whereas the dip angle influences the harmonic wave amplitude.

**GhulamNabiet. al. (2011)** the research paper presented hydraulic design of surge tanks for the two potential sites in Pakistan were analyzed for surge wave height and time to dissipate. Surge tanks designed for GolenGol hydropower project and Satpara hydropower project were analyzed for the hydraulic transient under the two operational scenarios i.e. complete closure and complete opening.

Results stated that for GolenGol hydropower plant the best surge tank system was two chambers as compared to surge tank with single chamber and without chamber. The dimensions of the two chamber surge tank were diameter of surge shaft as 9.0 m and height of the surge shaft was 100.0 m. This system gave minimum accumulated surge of 17.5 m. For Satpara hydropower plant, surge tank with lower chamber provided better results i.e accumulated minimum surge was 3.37 m, as compared to surge tank having two chambers and without chamber. The dimensions of the surge tank with lower chamber are diameter of surge shaft was 5.66 m and height of the surge shaft was 33.0 m.

Hence results concluded that for Satpara hydropower plant, surge tank without chamber and surge tank with two chambers produces high range of surges to cause undesirably heavy governor movement. While surge tank with lower chamber produces the minimum surge height as compared to other types, so the hydraulic behavior of surge tank with lower chamber is more stable than other types of surge tanks. Similarly for GolenGol hydropower plant surge tank with two chambers produces better surge protection as compared to surge tank with single chamber and no chamber.

**Bharti Tekwani and ArchanaBohra Gupta (2016)** the research paper introduced the investigation for shaft bolstered water tank of 500,750 and 1000 Cu.m limit, situated in four seismic zones (Zone-II, Zone - III, Zone-IV, Zone-V) and on three distinctive soil types (Hardstone, Medium soil, Soft soil). Further, 1000 kl tank for conditions - tank full, tank unfilled. The examination was performed utilizing MAT LAB. The parameters of examination incorporate base shears, base minutes and time history investigation. The models were broke down for various time history information, for example, El Centro, Kobe, Ji-Ji, Erzincan where the examination was made between the basic reactions of one mass and two mass models of above limit.

Results introduced that equivalent limit of tank extent of Kobe tremor was higher than the other quake on the off chance that one mass model just as a two-mass model despite the fact that the hour of the reaction was extraordinary. The reaction got on account of two mass model was normal and limited for each of the four sorts of seismic tremor

subsequently it is a progressively practical portrayal of the tank. The overhauled draft code which suggests a two-level of opportunity framework was a progressively reasonable portrayal of the tank structure.

**Tiruveedhula Chandana and Surendhar (2019)** the research paper introduced the exhibition of raised strengthened solid overhead water tanks to seismic and wind force. Tanks of different shapes, in particular, Circular, Rectangular and Intze Elevated water tank were displayed in STAAD.PRO programming. Gravity investigation, Seismic examination and wind investigation were performed on the demonstrated structure. From the examination results, the seismic parameters, for example, relocations, base shear and upsetting minutes were analyzed profoundly and thought about and cost investigation was performed for all the three water tanks.

While considering the shape and geometry, the outcomes reasoned that over-turning second was seen as more noteworthy in a rectangular water tank when contrasted with the other two water tanks (Circular and Intze). Under seismic stacking, Circular water tank was suggested. Under wind stacking, Intze water tank was suggested. Roundabout water tank encounters more prominent uprooting when contrasted with the other two water tanks because of its help conditions. Round water tank experienced more noteworthy base shear when contrasted with Rectangular and Intze water tanks. Looking at seismic examination and wind investigation results, Intze water tank was suggested. According to cost investigation, Circular water tank was seen as efficient when contrasted with the other two tanks expansions.

**J. Karol Argazinski et al. (2010)** the examination paper introduced the presentation of fluoropolymers in a few substance situations and depicts the mechanical case narratives. The fundamental centre was towards ECTFE pitch; the liners made from this gum performed very well for over 20 years in a few modern applications.

The conclusion expressed that Fluoropolymer had a fantastic compound obstruction, low porousness to fluid and gases, just as generally excellent quality and durability at raised temperatures. They have been generally utilized in substance creation, transport, and capacity frameworks. A few cases accounts of the ECTFE polymer were recognized during the most recent couple of years. The case chronicles summed up that the ECTFE funnels, liners and vessels performed very well in numerous mechanical applications. It gave great consumption assurance from forceful synthetic compounds for quite a while, and much of the time, for over 20 years.

**Dona Rose et al. (2015)** The research paper introduced the reaction of the raised round sort water tanks to dynamic

forces. Tanks of different limits with various arranging tallness were demonstrated utilizing ANSYS programming. The examination was completed for two cases to be specific, tank full and half level condition considering the sloshing impact alongside hydrostatic impact. The time history examination of the water tank was completed by utilizing quake speeding up records of El Centro. The tanks withstood the speeding up with the removals inside as far as possible. The pinnacle removals and base shear got from the examination were additionally analyzed.

The outcomes expressed that top relocations from the time history broke down under El Centro quake records was underneath the most extreme reasonable removal for various water levels. The pinnacle removal from the time history examination increments with arranging statures. Be that as it may, the uprooting first declines and increments with limits. The relocation for half-filled tanks was not exactly the removal for tanks with a full limit. The base shear esteems from time history examination were increments as arranging stature increments. Likewise, the base shears lessening and afterwards increments with a limit. Base shear for half limit tanks was lesser than that for full limit tanks under same organizing condition.

**Shivkumar Hallaleet. al. (2018)** the research paper introduced seismic conduct of roundabout raised water tank in the perspective of their supporting system (SHEAR WALL) is assessed utilizing limited component programming STAAD PRO. The essential target was to assess the impact of the shear walls on the conveyance of parallel force for round raised water tank utilizing identical direct static strategy programming STAAD PRO. All out twelve blends were broke down utilizing DYNAMIC ANALYSIS and results were introduced. The parametric investigation was performed on model with various arranging framework to assess their exhibition concerning sidelong firmness, relocation, seismic base shear, second, diversion, period and so on. The outcomes presumed that as the tallness of the pinnacle builds period additionally increments. On account of the shear divider with an expansion in tallness, period diminishes and furthermore the period was least when contrasted with outspread and twofold swagger arranging condition. As the tallness of the pinnacle expands the redirection of the pinnacle increments, if there should be an occurrence of shear divider diversion was least as a contrast with spiral and twofold swagger arranging condition. As the tallness of tower builds dislodging additionally increments and on account of the shear divider removal was limited when contrasted with spiral and double strut.

**Srinivasa Rao et. al. (2016)** The research paper introduced the seismic conduct of the raised water tank and examination of different seismic investigation parameters of the raised fortified solid water tank with thought and displaying of indiscreet and convective water masses inside the holder in Two-Mass Model according to IS 1893(part 2)- 2002. The conduct of raised water tanks with outline arranging design was investigated utilizing from the codes IS 1893 (section 1): 2002 and IS 1893 (section 2): 2002.

The conclusion expressed that the examination of the raised water tank with outline sort of arranging could perform better by following IS 1893 (section 2): 2002 as per IS 1893 (section 1): 2002 was distinctly for structures and isn't reasonable for fluid holding structures. The Base Shear and Overturning minutes acquired from the code IS 1893 (section 1):2002 was more than the qualities got from the code IS 1893 (section 2): 2002, this was because of the thought of the single level of opportunity in prior code. Further, the end expressed in the prior code the fortification was substantial, prompting uneconomical and this was considered as one of the burdens. From the ongoing code, the base shear and upsetting second were less from that the fortification which was diminished. It was extremely important to plan and break down the water tank as efficient as could reasonably be expected.

**ManojNallanathelet. al (2018)** the plan of water tanks of both overhead and underground tanks of shapes rectangular, square and round shapes are structured and examined utilizing Staad genius. The plans introduced that corner stresses and most extreme shear and twisting burdens were seen as less if there should be an occurrence of roundabout tanks than staying different structures and the states of water tanks assume an indispensable job in the pressure appropriation and general economy. By utilizing Staad.pro, the outcomes got were exact than traditional outcomes. In the Underground tank, Uplift pressure assumed an overwhelming job in a structure which was caused due to encompassing soil on outside dividers of the tank. The state of the tanks assumed a dominating job in the plan of overhead and underground water tanks. Utilization of Staad ace in configuration gave exact outcomes for the shear forces and bending moment than an advantageous technique.

**Prashant A Bansode and V. P. Datye (2018)** The objective of the research paper was to introduce the conduct of intze sort of raised water tank. It has likewise degree to consider seismic conduct by changing the state of the water tank, for example, Rectangular or Circular water tank. Also, Model considered in the investigation was situated on hard soil and in zone 3. Reaction Spectrum Analysis was completed on three distinct sorts of propping frameworks of the raised water tank in all

zones by utilizing STAAD Pro V8i 2007. Examination of base shear and nodal relocations of raised water tank for the vacant and full condition was finished. The spring-mass model according to IS 1893:2002 Part 2 was utilized for the examination.

The conclusion expressed that base shear increments as the degree of supporting increments on the grounds that, the propping framework put on extra mass to the structure, which brought about an expansion in base shear esteem. So also, the base second was seen as expanded as the degree of propping increments. Horizontal removal and timespan of vibration were diminished extensively in light of the fact that supporting frameworks expands the firmness of the structure, which lessens the sidelong relocation and consequently the timeframe of vibration.

**Krishna Rao M.V et. al. (2015)** the research paper conveyed investigation for a raised roundabout tank of 1000 Cu.m limit, situated in four seismic zones (Zone-II, Zone - III, Zone-IV, Zone-V) and on three diverse soil types (Hardstone, Medium soil, Soft soil). Further, three distinctive tank-fill conditions - tank full, tank half full, tank void were considered in the investigation. The seismic reactions of round tanks were processed and analyzed dependent on the hypothetical systems of IS: 1893-1984 and IS: 1893-2002(Part-2) draft code. The examination was performed utilizing SAP-2000 programming bundle moreover. The parameters of examination included base shears, base minutes, indiscreet and convective hydrodynamic weights on the tank divider and base section.

The consequences of the examination demonstrated an expansion in base shear, base second, hydrodynamic weight and timeframe with expanding zone factor for all dirt kinds and tank fill conditions considered. The expansion in base shear and the base second was seen as in the scope of 54% - 260% in the investigation performed utilizing draft code over the estimations of IS: 1893-1984. The hydrodynamic weight expanded in the scope of 54%-280% with the utilization of draft code over the qualities got dependent on IS 1893-1984. The aftereffects of SAP-2000 was found to concur with those of the draft code. The expansion in indiscreet hydrodynamic weight, with expanding zone factor, on the divider and a base chunk was higher for tanks examined utilizing draft code when contrasted with the consequences of Seems to be: 1893-1984.

**Ramakrishna Hegdeet. al. (2018)**this project presented comparison between the circular water tank and rectangular water tanks dealing with the optimum working needs of both of them. 21000 liters capacity tank was utilized for design in

this project. The water tank construction of tanks was Rebars, cement, sand, aggregate and formwork.

The conclusion derived from the results stated that maximum principle stresses was found in circular tank in comparison to rectangular tank. Hoop Tension was less in rectangle tank with values as 120 Kn than circular tank with values as 180 Kn. Area of steel was 490 mm<sup>2</sup> for rectangular water tank and 734 mm<sup>2</sup> for circular water tank. Formwork was found maximum in rectangular tank than the circular water tank.

**M. Bhandari and Karan Deep Singh (2014)** the research paper inspected the cost-viability as far as the quantity of materials and formwork utilized for Circular, Square and Rectangular overhead water tanks every one of three limits of 100kl, 150kl, 200kl and draw sensible derivations on tank's shape structure adequacy. Each water tank was structured by Limit State technique and afterward the split width was checked by limit condition of functionality IS 3370 (2009). The outcomes were introduced as diagrams and tables and it was seen that Circular-molded tank devoured lesser of every material when contrasted with Square and Rectangular ones. The measure of formwork required for the roundabout tank was likewise not as much as that for square and rectangular tanks in this manner giving Circular-molded tanks an increasingly good choice over the rectangular and square-formed tanks.

The outcomes presumed that as the limits increment, the measures of materials for the structure additionally increments. In any case, a fairly non-flawless proportionality brought about a relative increment in the limit would not really lead to a corresponding increment in any of the materials required. The amounts of materials required for the rectangular water tank were continually more than those required for the square tank which is more than the amount required for the round water tank, at each changed limit. The outcomes that the formwork required for the development of a water tank was least for the round molded tank when contrasted with square-molded and rectangular-molded tanks. The development material-yields for all water tank limits would be founded on the decision of the plan contemplations and the outcomes expressed that the round formed tank was the most conservative among other two shapes considered for concentrate according to IS3370 – 2009 receiving limit state technique for structure.

**A C. Chouguleet. al. (2017)** the research paper introduced a parametric report on the spring-mass model, timespan in imprudent and convective mode, structure level seismic coefficient, base shear and hydrodynamic weight because of

the incautious and convective mass of water was thought of. It was discovered that under the impact of seismic force with expanding proportion of greatest profundity of water to the measurement of the tank (h/D) the more mass of water will energize in indiscreet mode while diminishing proportion of (h/D) more the mass of water will energize in convective mode. The Time-time of Impulsive mode increment with an expansion in (h/D) proportion and the Time-time frame in convective mode decline with an increment in (h/D) proportion. It was expected that the tank was situated in seismic zone IV.

The conclusion expressed that on account of the rectangular water tank with a similar stockpiling limit and diverse tallness of tank divider if the h/L proportion was up to 0.6 the base shear, Bending Moment & Max. Hydrodynamic weight increments step by step and if the h/L proportion was in the middle of 0.6 to 0.8; it abruptly increments and after that, it diminishes bit by bit. So for a water tank at ground level, the h/L proportion up to 0.6 was possible. For roundabout and rectangular water tank with a similar stockpiling limit however the diverse tallness of the tank divider, sloshing wave stature increments up as far as possible and from that point forward, it diminishes step by step. The expansion in the proportion of most extreme profundity of water to the measurement of the tank for example (h/D) or (h/L) will prompt increment in imprudent mass cooperation factor and reduction in convective mass support factor. On account of a roundabout water tank for h/D proportion 0.4, the mass investment factor for rash and convective was almost equivalent. On account of a rectangular water tank for h/L proportion 0.5, the mass interest factor for indiscreet and convective was almost equivalent.

**Chittaranjan B. Nayak and Sunil B. Thakare (2019)** the research paper developed orderly examination metrology for condition positioning strategy dependent on the investigative chain of importance process (AHP) and fortifying by different retrofitting procedures. The contextual analysis incorporated a current raised water tank, which was structured by cutting edge more than 40 years prior according to the old Indian Standard (IS) code. The positioning evaluation of the raised help store was done utilizing diverse non-dangerous tests (NDTs). DER, i.e., degree (D), degree (E) and significance (R) rating method were utilized to discover the condition file of the raised assistance supply (ESR). After finding the condition positioning of the current structure, an examination was completed utilizing SAP 2000 to distinguish seismic necessities utilizing IS codes. According to the seismic interest of the water tank, different retrofitting techniques were received for improving the float limit and flexural limit of the structure.

The outcomes tended to as far as a timespan, mode shapes, base shear, uprooting, increasing speed, and speed. For the methodical examination, the determination expressed that a condition positioning methodology dependent on AHP has been proposed. DER rating procedure was utilized to discover the condition positioning of ESR at Baramati, Pune, Maharashtra (India). The CI of ESR was seen as exceptionally poor, there was broad crumbling, and the water tank was scarcely practical. Recovery or reproduction is required with a security assessment. In the seismic examination, the estimation of story float surpasses the breaking point given by IS 456-2000. Consequently to keep up the given structure, opposing the seismic forces retrofitting of the given structure is essential. The estimation of story float was diminished 9.50%, 30.01%, 39.06%, and 44.45% by the arrangement of IS 1893-2016, for FRP, damper, and supporting, separately, when contrasted with IS 1893-2002. The most minimal float was watched for the propping framework. In the wake of retrofitting, the base shear was expanded. The expansion in base shear was progressively articulated. It has been seen that the timespan of higher mode for all cases was very comparable. In any case, the time-span of lower mode will in general contrast more. The removal of the water tank was decreased 21.33%, 84.89%, 88.28%, and 92.89.45% by the arrangement of IS 1893-2016, for FRP, damper, and propping, separately, when contrasted with IS 1893-2002. The most extreme decrease in removal was seen in the supporting framework than every other case. The speed was diminished 8.85% for IS 1893-2016, 34.85% for FRP, 48.39% for damper, and 54.57% for propping concerning IS 1893-2002.

**SagarMhamunkaret. al. (2018)** purpose of research work at an Elevated Storage Reservoir (ESR) while planning and breaking down a sheltered ESR, Where in the harm to the structure and its structural parts even by a characteristic peril, for example, a seismic tremor can be limited. Indian standard for the plan of fluid holding structures has been modified in 2009 which joined cutoff points state plan strategy. Breaking point state plan strategy for water holding structure was not embraced so far as the fluid holding structure ought to be sans split.

The conclusion from the examination paper expressed that raised round water tank with enormous limit and level base need huge fortification at the ring shaft, to conquer this was intze tank, by giving a cone-shaped base and another circular base decreases the worries in-ring pillars. Intze tank was progressively prudent for high limit diminishing the steel necessity. Per capita request was determined which inferred the water utilization in a surrounding and further aided structure the tank. Breaking point state technique was seen as generally conservative for

the plan of the water tank as the amount of steel and cement required was less when contrasted with the working pressure strategy. The manual plan and programming investigation of the structure ends up being safe.

**Khem Prasad Bhattaraiet. al. (2019)** the research paper carried surge analysis so as to examine vital parameters of hydraulic transient caused by opening and closing of the valve. Optimization was done using PSO to investigate the best values of DO and DS and enhance the performance of the surge tank. Effects of various parameters during hydraulic transients were presented and favorable conditions were demonstrated.

The conclusion derived from the results stated a model of a generalized hydropower system consisting of an upstream reservoir, an orifice surge tank, conduit pipes, and an outlet valve was designed and numerically analyzed using MOC in MATLAB. Surge analysis by MOC revealed the variation of water level in the surge tank in different conditions and assisted in defining and modeling the required hydraulic parameters for optimization of the surge tank. The maximum and minimum possible water level in the surge tank and damping of surge waves were considered as the important parameters for surge tank optimization. Analyses showcased that these transient behaviors was highly conflicting in nature for different values of DO and DS. In addition, for certain values of DO and DS, the difference of maximum piezo metric head at the bottom tunnel of the surge tank and maximum water level in the surge tank was unacceptable. Hence, a proper optimization method was necessary to investigate the best values of DO and DS to enhance the efficiency of the surge tank and minimize the effects of transients in the worst conditions; The Particle Swarm Optimization successfully optimized the values of DO and DS with a significant improvement in the maximum and minimum water level in the surge tank with reasonable damping of surge waves and the recommended surge tank was free from vortex formation.

The overall performance of the surge tank was better than the contemporary methods. Based on the sensitivity analysis of the valve's closing and opening time, significant changes were observed in surge analysis for different closing and opening times of the valve. This indicated that valve or guide vanes' closing/opening time should also be considered during the hydraulic optimization of the surge tank in further cases. The difference of maximum piezo metric head at the bottom tunnel of the surge tank and maximum water level in the surge tank was presented for various times of closure of the valve and it was concluded that the closing time of the valve results in more significant pressure changes in the

penstock pipe and headrace tunnels, while in the surge tank, the effect is comparatively lower.

**Santosh Rathod and M. B. Ishwaragol (2018)** the research paper introduced the conduct of the Reinforced concrete solid overhead water tank of limit one lakh litre and a correlation was made in the middle of the model with various organizing tallness and with various base width and the examination was done utilizing Staad.pro Software. Water levels for example full tank level, Earthquake zone III was considered in the investigation. A similar report was completed concerning Bending second, Shear Force and Displacement variety of the segments and supporting bars with various organizing stature and base width of the water tank.

The ends expressed that bending moment worth has marginally expanded because of the expansion in organizing stature and the bowing second expanded by 2.9%, 3.1% separately because of the breeze load on the water tank. It was seen that as the stature of the barrel-shaped divider diminishes and base width builds the benefit of bowing second definitely expanded by 32.0% and 38.8%. The base shear esteem has marginally expanded because of the expansion in organizing stature and the base shear was expanded by 3.3%, 3.6% separately. The tallness of the round and hollow divider diminished and base width expands the estimation of base shear radically expanded by 45.0% and 47.0%. The dislodging esteem has expanded because of decreased stature of the barrel-shaped divider and expansion in base width, the relocation is expanded by 39.38% and 46.4% individually.

**Resham Dhakalet.al. (2020)** the primary objective of the research paper was to present functions of optimization with the maximum upsurge, the maximum downsurge, and the damping of surge waves. The worst condition of upsurge and downsurge was determined through 1-D numerical simulation of the hydropower system by using method of characteristics (MOC). Moreover, the sensitivity of dimensions of a double chamber surge tank was discussed to identify their impact on objective functions; finally, the optimum dimensions of the double chamber surge tank was found using non-dominated sorting genetic algorithm II (NSGA-II) to control the water level oscillations in the surge tank under transient processes. The volume of the optimized double chamber surge tank is only 44.53% of the total volume of the simple surge tank, and it serves as an effective limiter of maximum amplitudes of oscillations.

Results stated, in the hydropower system with multiple units, controlling the water level oscillation in surge tank was a major issue. The most effective operation mode should be adopted to limit the amplitude of surge in the surge

tank. Surge can be killed by acceptance of load in multiple stages.

## II. CONCLUSION

The literature review has suggested that use of a finite element modeling of the structure.

1. Maximum Principle stresses are generally found in circular water tank in comparison to rectangular water tanks.
2. Circular water tank experienced greater base shear when compared to Rectangular and Intze water tanks. Comparing seismic analysis and wind analysis results, Intze water tank was recommended. As per cost analysis, Circular water tank was found to be economical when compared to the other two tanks extensions.
3. Midas gen is a general purpose application durable for modelling and extract the analysis with maximum accuracy in comparison to other applications.

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