Review Paper on Progressive Collapse of Cable Stayed Bridge Using Sap2000

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Abstract- *This paper discusses the nonlinear analysis of cable strayed bridge using Time History. In this paper dynamic behavior of cable stayed bridge with different structural configuration with seismic loading was studied. New correlation for EDR (Earthquake displacement ratio) and PGA (Peak Ground acceleration) was established with the use of El-centro data. The comparative study is made for FAN type and HARP type cable stayed bridge. In that peak ground acceleration (PGA), natural frequency and time period are compared.*

Keywords- Cable stayed bridge, Time history, SAP 2000.

I. INTRODUCTION

Cable stayed bridges have been known since the 16th century and cast off broadly from the 19t. This ongoing control is because of the advancement of steady high quality steels for the links and maybe more unequivocally, the start and far reaching utilization of PCs to investigations the complicated numerical reenactments. A link stayed connect has at least 1 towers (or arches), from which links sustenance the extension deck. An unmistakable element is the links which run relentless from the pinnacle to the deck, by and large framing a fan-like shape or a progression of equal lines. This is in differentiation to the propelled suspension interface, where the connections fortification the deck are suspended vertically from the basic connection, secured at the two pieces of the deals and running between the towers.. The connection stayed associate is perfect for ranges longer than cantilever ranges and shorter than suspension ranges. It by and by got up in the far along 20th century when the mix of new materials, enormous structure hardware, and the need to change more established scaffolds all dropped the general cost of these plans.

Building data demonstrating (BIM) and related issues has been a subject of extreme innovative work, as detailed in the on-going insightful writing. Enhancements in the effectiveness of the arranging and configuration forms, development arranging and control, plan development coordination, and offices administration have been dissected. Moreover, benefits got from BIM usage have been characterized in light of upgrades accomplished all through building-related procedures.

Cable stayed bridges may look alike to suspension bridges together have streets that swing from links and together have towers. Yet, both the scaffolds bolster the heap of the street in not at all like ways. The difference lies in how the links are connected to the towers.

Link stayed scaffolds may resemble the other the same to suspension connects together have streets that swing from links and together have towers. Yet, both the scaffolds bolster the heap of the street in not at all like ways. The difference lies in how the links are connected to the towers. Link stayed spans are auxiliary frameworks which are viably made out of links, fundamental braces and towers. A scaffold conveys vertical loads predominantly by the brace.

The staying cables give halfway backings to the brace with the goal that it can cover a long separation. The essential auxiliary type of a link stayed connect incorporates a progression of covering triangles involving the arch (or the pinnacle), the links, and the support. Every one of these individuals are under overwhelmingly pivotal powers, with the links under pressure and both the arch and the support under pressure.

II. LITERATURE REVIEW

P.Garg et.al. (2019) [1] 'Analysis of Cable Stayed Bridge for Different Structural Models'. Two structural models are used for analysis purpose viz. Spine model and Area Object model. Static analysis and moving vehicle analysis have been done in which IRC Class A vehicle load is applied and their load combination is considered for evaluating the results.

Axially loaded members are commonly more proficient than flexural individuals. Territory of development Mr. R. Das et.al. (2016) [2] the creators proposed 'Dynamic Collapse of a Cable Stayed Bridge'. This examination shows demonstrating and investigation of a run of the mill link stayed connect through a nonlinear unique technique.

The outcomes showed a decrease in the chance of disappointment movement of the link remained model when the area of the bombed links was nearer to the arch. An unmistakable dynamic breakdown design was likewise distinguished along this method. The end links of either side of the extension are the most powerless links. Break in these end links expands the likelihood of a disappointment movement all through the entire structure.

Lesser the separation of the link from the arch, lesser will be the opportunity of disappointment of the entire structure. Mr Bo Sun et.al. (2016) [3] This paper presents 'Probabilistic air dependability limit models and delicacy gauges for link stayed connect decks dependent on air stream test information'. Wind obstruction configuration is of crucial significance for long adaptable structures like link stayed spans.

The created models are developed to give adjusted evaluations of the limits of intrigue and appropriately record of the applicable vulnerabilities. The deliberate limit esteems from air stream tests are utilized to decide the consequent insights of model parameters through a Bayesian methodology. Amir Fatollahzadeh et.al. (2016) [4] one of the reasons for Progressive breakdown is the disappointment in various components during extreme occasions, for example, seismic tremor or serious breeze.

The outcomes show that the mentioned circumstance during Tabas and Loma Prieta seismic tremors will prompt dynamic breakdown, while the structure can withstand two links expulsion during the Bam quake. To maintain a strategic distance from this decimation, six base disconnections are introduced underneath the structure. S.K. Hashemi et. al. (2016) [5] Over the previous two decades, impact loads have been perceived as one of the outrageous stacking occasions that must be considered in the plan of significant structures, for example, link stayed spans.

Be that as it may, plan arrangements for impact safe scaffolds are constrained and for the most part observational attributable to a deficient comprehension of the neighbourhood and worldwide unique reaction of the extension segments (wharfs, deck and links) exposed to impact stacking situations. Three distinctive unstable sizes, for example, little (01W), medium (04W) and enormous (10W), are considered (W being the TNT comparable dangerous weight record) and set at various areas over the deck level to decide the impact of the size and area of the shoot stacks on the worldwide and nearby reaction of the scaffold parts.

In certain, the results of the PC entertainments are utilized to assign the sort and degree of damage on the arch and deck, and alsoto explore the reasonable link misfortune conditions related with an expense of quay. M.A. Bradford et.al. (2016) [5] Here one of the extraordinary stacking occasions that must be considered in the plan of significant structures, for example, link stayed spans.

Since configuration arrangements for impact safe scaffolds are extremely fractional and oftentimes experimental remarkable to an insufficient comprehension of the nearby and worldwide powerful reaction of the extension constituents (wharfs, deck and links) exposed to impact stacking situations. Appropriately, this examination creates nitty gritty limited component models ofa steel link stayed scaffold and it is investigated utilizing an express solver.

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Yufen Zhou et.al. (2015) [6] this examination incorporates 'Numerical examination of link breakage occasions on long-range link stayed connects under stochastic traffic and wind.' Cable breakage (misfortune) occasions can be grievous to link stayed spans due to potential dangers of dynamic breakdown following the underlying disappointment of stay links. To abstain from turning a link breakage danger into a debacle, it is critical to judiciously figure the hazard through precisely anticipating the nonlinear lively comportment of the scaffold risked to different sorts of link misfortune occasions.

The outcomes likewise demonstrate that administration traffic and wind stacks just as intricate coupling impacts with the scaffold are critical to the extension response following link misfortune preliminaries. In the last piece of the investigation, reaction envelope investigation is made and a similar assessment is additionally led between the outcome from the extreme FE-based nonlinear powerful methodology and those from the equivalent static methodology as proposed by the Post-Tensioning Institute (PTI).Allan Larsen et.al. (2015) [7] this paper proposed ‘Dynamic wind things on suspension and cable stayed bridges. Suspension and link stayed spans are exceptionally adaptable and gently damped structures whose Eigen technique shapes and Eigen regularities are very much anticipated by Finite Element strategies. Auxiliary elements is the key segment of the air versatility of these extensions and must be determined so as to

survey wind consequences for the scaffolds. The surviving paper examines the most open marvels identified with wind things on suspension and link stayed spans underlining the noticeable job of the dynamic powers of the structures and accentuating the creators' nostalgia.

Kuihua Mei et. al. (2015) [8] The authors present 'Presentation study on the first cable stayed bridge with CFRP cables in China.' The main CFRP link stayed connect in China is put in the center grounds of Jiangsu University. It is a person on foot connect with one arch, twofold link planes and a separation of 48.4 m (primary range is 30 m and side range is 18.4 m). The docks, arch and brace of the scaffold are intertwined formed. The stay links are made of CFRP ligaments, while the brace and the arch involve strengthened solid structures. Carbon fiber fortified polymer (CFRP) has various outstanding belongings, for example, light weight, high rigidity, erosion opposition, superb weariness quality, and accordingly it is generally utilized in the field of civil engineering presently.

A.M.B. Martins et.al. (2015) [9] this paper addresses 'Optimization of cable forces on concrete cable stayed bridges including geometrical nonlinearities.' Cable stayed bridges are appealingly pleasing and have been generally used all over the world, oscillating from small pedestrian bridges to extended span railway and road bridges. The calculation of the cable forces is a typical aspect of a cable stayed bridge project when related to other forms of bridges. Cable tensioning is mandatory to controller the geometry, stress spreading and to exact construction errors.

P. Lonetti and A. Pascuzzo (2014) [10] the creators proposed 'Ideal plan examination of cross breed link stayed suspension spans'. It incorporates a structure philosophy to foresee best post-tensioning powers and dimensioning of the link framework for cross breed link stayed suspension (HCS) spans is wanted. The basic model is based on the blend of a FE style and an iterative enhancement technique. The previous can manage the cost of a cleaned clarification of the extension structure, which takes into understanding geometric nonlinearities expand in the scaffold mechanical assemblies. The last is worked to expand the state of post-tensioning powers just as the geometry of the link framework to finish least avoidances, most minimal steel size expound in the link framework and extraordinary introduction of the links underneath live burden compliances. Results are arranged as far as evaluations with existing definitions to approve the anticipated technique. Besides, parametric examinations on progressively complex long range structures are likewise evolved to check standing link dimensioning guidelines and to assess between HCS spans and unadventurous link stayed or interference structures.

Vikas A.C et.al. (2013) [11] In the present work a link stayed extension of fan type game plan is broke down for static and dynamic burden. The examination is finished with all the links under typical condition, distinctive level of erosion of one link and the unnatural birth cycle of one link because of extraordinary consumption. The investigation is performed utilizing limited component technique programming MIDAS programming. The product is approved with straightforward scaffold model.

The extension is dissected for moving burden case according to the IRC 6-2000 and furthermore for quake and for various burden groupings. The impact on pivotal powers in link, avoidance of deck, characteristic recurrence, mode state of the structure and seismic tremor reaction of the Cable Stayed Bridge is considered. It is reasoned that the decrease in region of the link because of consumption diminishes its malleable limit.

III. OBJECTIVES

1. To perform the progressive collapse analysis along with blast load for the cable stayed bridge having different cable arrangements and pylon geometry.
2. To compare the absolute displacements of girder and axial cable forces under progressive collapse mechanisms.
3. To calculate the demand to capacity ratios for the cables to find out the structural stability against the progressive collapse mechanism.
4. To find out the most suitable cable arrangement and pylon geometry against the progressive collapse.

IV. CONCLUSION

This paper focuses only on the literature review of previously published studies. The discoveries of this paper this study shows demonstrating and examination of a run of the mill link stayed connect through a nonlinear powerful method. The outcomes showed a decline in the chance of disappointment movement of the link remained model when the area of the bombed links was nearer to the arch. The created models are built to give adjusted assessments of the limits of intrigue and appropriately record of the significant vulnerabilities. The measured capacity values from air stream tests are utilized to decide the consequent measurements of model parameters through a Bayesian methodology.

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