Exploration of Seismic Analysis of High-Rise Buildings

[1] Ashish Khatri, M. Tech.(Structural Engineering)
[2] Jaswant Singh, Asst. Prof., Dept. of Civil Engg.
[1,2] CBS Group of Institutions, Jhajjar-Kosli

Abstract: *In the last two years, earthquakes have occurred periodically worldwide. Strong earthquakes and their consequences have had numerous adverse impacts on people's lives and social stability. Defending against earthquakes, detecting hazard regions and forecasting harm after earthquakes is becoming increasingly relevant. Whether to correctly identify damage regions based on remote sensing photos is a big issue. This research will examine harm and its impact on the potential existence of high-rise buildings. A new method of system identification and high-rise building damage detection is introduced, where a shear-bending model describes high-rise buildings. The method is designed to find the story shear and bending tension of a specific theory just above and below the particular task of high-rise buildings. This paper demonstrate the damage detection of building which get deformed after the Earthquakes for High-Rise Buildings.*

Keyword: *Earthquakes, High-Rise Buildings, Building Damage Detection, Bending Stiffness, Seismic Analysis*

I. Introduction

Skyline is a high-rise apartment structure, 40 to 50 floors high, some 100 meters tall. Historically, it represents 10-20 storage buildings in 1880. This definition changed with 20th century building technology development. A common feature of sky scrinter is a steel frame supporting curtain wall. These peripheral walls are mounted on a typical building's loading wall rather than the bottom frame or suspended. Some skyscrapers in some ski skewers have a steel frame that allows the use of strong concrete long-term wall. The walls of modern ski sprinters are not completed, and most Sky Scrubs have large windows, potentially steel frames and curtain walls. However, the surface of the Sky Screens curtain wall can duplicate the traditional small window area. Modern scrapperers are usually designed to have tubular structures and are designed to work against the air, earthquake, and other backdrop loads as hollow cylinders. To see more troubles, reduce the effects of storm and shine more sunlight on earth, many scissors designs are frustration and sometimes structural differences.

1.1. High-Rise Building

There is a closed building with building wall, floor, ceiling and windows. "Advanced building" is a multi-purpose building, and most travelers depend on [elevator] to reach their places. The most important buildings in most countries are called "high buildings" and is called "turrets" in the UK and in some European countries. These meetings do not include international appreciation of the agreement. However, advanced buildings can define the following:

- For most purposes, there are about seven cut points in a high building, sometimes seven or more floors, sometimes more than seven floors, and a long time appreciation story is appreciated.

- Usually, the advanced structure exceeds the largest way of firefighting equipment available. In absolute numbers, this setting is between 75 feet (23 meters) and 100 feet (30 meters). "Level 7 to 10 (depending on the distance between tiles and floor tiles).

- The exact height of the oldest building depends on the country's country, region, or city's fire and building code, where the building is located. When the building is more than a certain height, instead of using fire-fire and stairs to fire and permanent risks in these facilities, it is necessary to destroy the firefighters inside the building. To be more practical and comfortable, a multi-purpose or multi-story structure uses an elevator as a vertical transport system, and people who use some angels move between low floors.

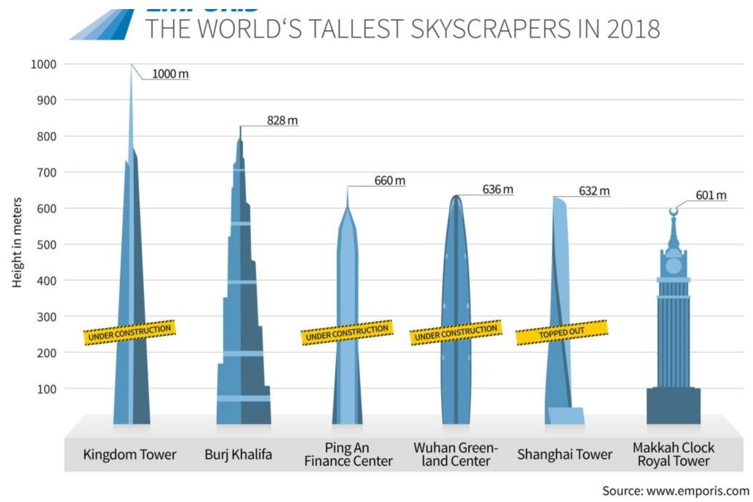

Fig 1: World's ten tallest vanity heights

1.2 Development of High-Rise Buildings under Seismic condition

In these areas "From the urban areas", "Now they are called producers with the combination of gratitude and liver awareness towards the dangers of young men, The Belle The Watchtower warns of pride and deviation, not as a purpose. After creation, People long wanted to go to Babylon.

Let us make ourselves a city and a tower in heaven, and make us a name, so that we will not be scattered on the face of the earth

1.3 Types of tall buildings

The use of buildings has a great impact on safety and fire protection requirements. According to their main purpose there are different types of ratings. This book addresses the following address:

Office building: Office building is a structure designed for business activities and is typically divided into separate offices and provides rent or wage space.

Hotel building: The term "hotel" is a complete rating of all facilities that provide comfortable accommodation, but not always catering or drinking or entertainment or any other environment or "off-site" business services.

Residential buildings and apartments: A residential building consists of a single house where a person can live or stay on a regular basis. Each has its own kitchen facilities and a bathroom, which can be called apartment, home, house or apartment. A residential building is a "building which includes a number of housing units." Residential buildings are in buildings, with more than three or more residences with kitchen facilities and separate bathrooms, apartments with apartments, apartments or gardens.

Multi-purpose buildings: Includes multi-purpose offices, apartments and houses as well as the hotel's room, building in different parts of the same building. Hotel accommodation is another multi-carrier. "Hotel's address, such as small hotel units, is very different from its predecessor, there is a lot of time, which has non-special property, or hotel apartments, hotel rooms, all but did not, such as But there is a kitchen, a common place, with a maiden and a room service, as well as restaurants like restaurants, spas and gymnaziums are located at the hotel's upper floor." After the earthquake, high resolution SAR artificial Building troubleshooting data using the planet.

After the Vichun earthquake on May 12, 2008, satellite radar images were very important in the support of rescue operations because they were able to run day and night independently from weather conditions. However, use of artificial aperture radar (SAR) data makes it difficult to identify harmful or damaged buildings. Standard method for identifying damaged buildings is to detect changes in post-earthquake and pre-earthquake photos after the earthquake, instead of high-resolution images of files stored from the remote areas affected by the Vichan earthquake. Therefore, buildings damaged with SAR images are estimated to be damaged only after the incident. In this article, SAR photos have been ideological concepts on the appearance of demolished buildings, and evaluation of Visual Features of original SAR images in this area has been verified.

II. Research Background

B. Calcagni, M. Paroncini (2004) checks the main features of the atrium and its effect on daylight conditions in adjacent spaces and lobby floors. This shape of the atrium and their direction towards the sun, the reflectance of the surface, the reflectance of the atrium surface and the area of the glass are important parameters in the design of the atrium structure day and night. Using Radiance as a tool to simulate a computer, several atrium conditions characterized by another well were analyzed, along with a simplified method to predict daylight and the daylight factor of the adjacent room.

A. Hunter Fanney, Mark W. Davis Brian, P. Dougherty(2001) This article shows a new process for calculating the internal heat of the integrated photovoltaic module, which uses a single-dimensional transmit model over heat. The following forecast was compared to the heat of BIPV cells compared to two BIPV plates (separator and non-integrated plates). In the end, the results are compared using the NOCT prediction.

Ting-Yu Hsu and Chin-HsiungLohe**(February 2009)** Then the NLPCA prediction model is proposed to measure the level of damage. This proposed process can not only collaborate with increasing incoming features, for example. Crushed, but also non-diminished features, for example, damage to injury, after the introduction of damage without directly measuring natural features. Digital research is performed to illustrate the benefits of proposed technology in this process through the analysis of basic components. The bridge model is designed to minimize the complexity of the feature and adjustments due to natural conditions, including temperature, temperature gradients, humidity and snow stents. The results show that the stability level of stability can be accurately directed and back after the injury has occurred.

Piyawan Kasemsuppakorn, Hassan A. Karimi (2013) At present, pedestrian networks are rarely like the traffic network, due to high demand for applications such as car traffic. However, this situation is changing rapidly because mobile devices supporting GPS are the most common in pedestrian programs and can collect voluntary data. For this reason, there is a need to develop effective and rewarding strategies to collect and develop pedestrian information. This document provides an algorithm for automatically detecting geometric shapes on channel lines and installing targeted GPS networks. An algorithm tested on Open Street Map (OSM) using two data sources, archive results and travel results. By comparing the integrated pedestrian network with the testing network base and counting quality ratings in three areas, the data was verified by collected data. The OSM experience has been verified by the clear scanning of the top map to display highlights. The results of the exhibition show that an algorithm can automatically create pedestrian networks.

III. Multi-spectral data evaluation under Seismic condition

In the beginning, data for multispectral digital cameras (three stations, RGBs) and Videocon cameras (with four channels, see above) have been tested separately and split image separation. While digital camera data processing has already generated results, Videocon's image data processing produces satisfactory results. This is due to a small bandwidth of total value and a link between open channels that are open for the filters used. For better results, digital camera data and infrared data were used separately. For this reason, the infrared data set has been converted to another image data with two consecutive multilevel versions with integrated image interpolation. Due to the high resolution between red photo channels, the baseline analysis (PCA) is done.

In the case of a construction wall, a channel is calculated with vegetation indexation using a red channel and 850 nm. In addition, a texture channel with homogeneity standards is available to obtain more information about the object, so the probe object has up to six channels: RGB, Infrared (PCA), NDVI and Harmony. For the data of the sandstone wall, some details are different. Due to the low dynamic infrared images, the first PCA component was selected for the calculation of NDVI. The surface of the sandstone has small differences in shape, which results in a low variation of the values measured in the tissue channel. Therefore, the homogeneity account of the channel was eliminated.

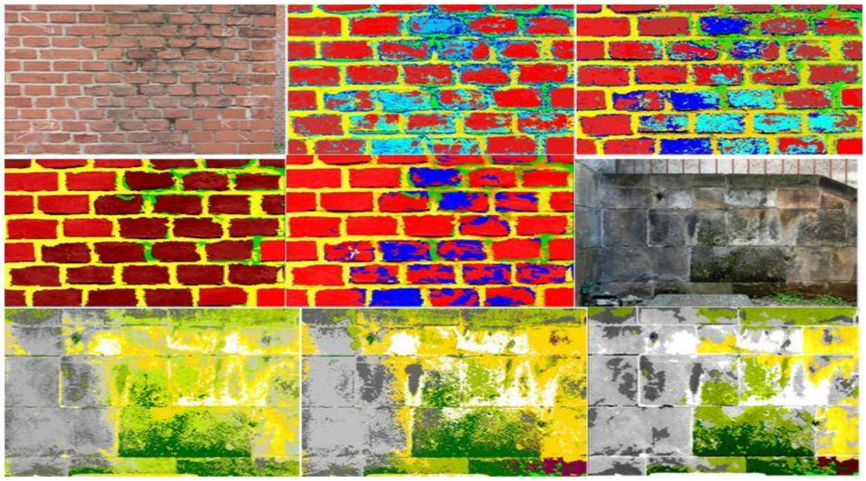

Figure 3: Damaged masonry wall, overview image taken with digital camera.

Masonry wall: Figure 3 shows results based on construction wall pixels. Although the subdivision is not governed by the component due to the negative results, especially in non-shaded areas, biological controls provide good results because the rate of chlorophyll is highly favorable to infrared data. It should be noted that the moisture content is not integrated with the water flow line, which means moisture is compacted only with signature display (light and blue). Targeted split offers gives similar results. Contrary to the separation of both pixels, stone bricks and bricks and damaged areas are blended into different objects. Additional information allows the body station to repair brick shape. The availability of humidity and the environment is available, and salt is open and shown in a separate way

Sandstone wall: Figure 3 show the results of the pixel-based classification of the sandstone wall. In contrast to the widely protected sandstone (yellow), the damage of the fat layer (green), the climatic factors (gray) and salt blooming (white) is clearly visible. In the case of supervisor classification, in addition to contaminated areas (brown) and foreground plants (green light) can be identified. Due to the insufficient results of the fragmentation of objects with cloth filters, a common map was used to classify the orientation in order to obtain separate stone elements. Therefore, it is possible to map different sections of sub-cuboids and sandstone subdivisions in the full and open joints. The results below are comparable with the pixel-based classification results. In both cases, it is difficult to classify protected and remaining sandstone

4. Proposed Work & Result

This research offers a new way by frequency-based developing conceptual to identify device detection and failure of equipment-controlled building structures with semi-active frictional dams. First, construct two building states by using semi-functional active friction to improve the apparent hardness. Taking into account the structure of connectivity and change, the basis of the frequency of response to the two states of the building was proposed to determine the hard working parameters of the plan members. By implementing a model updating plan for an unfavorable building, a planning test based on hard parameters of structural components of medium and damaged buildings was proposed. The potential closure of the proposed program is characterized by a detailed study that discusses measurement noise and motivational terms.

A lot of investigations on vibration and health monitoring of civil infrastructure under earthquakes or under Seismic condition and strong winds have been conducted in the past decade. However, active vibration systems and health monitoring systems are managed differently including sensors, equipment for data acquisition and data transmission, vibration firms, and areas for health monitoring. When a vibration control system and a health monitoring system are required for the building structure, both systems are implemented using the same hardware device, and the processor is used to create a cost-effective and disappearing sensor (nerve system). One of the key issues in the integration of the brain system and the functional vehicle (muscle system) is how to use the control device to detect system identification and loss. However, these studies have focused on the active control of mechanical systems. It is different from civil society. Problems and structural systems that can lead to active control are more complicated. This study provides a way to detect new control system identification and losses. After this, a scheme is presented to update the matrix on the basis of frequency response of two states and consider structural contact and change information about identifying strictly strict parameter parameters. Goes away it is certain that the building damaged some after an event or long-term service, and the damaged building was implemented, damaged, damaged due to which structural components of the original and destroyed buildings Damaged on the basis of hard parameters. Test program the potentially closing building of the proposed scheme was featured in a detailed number of studies, where measurement noise and encouraging conditions were discussed.

4.1 Theoretical development

Equation of motion

A general second-order differential equation of motion of a building structure with n of is given by

M X(t)+CX(t)+KX(t)=f(t)……….. 4.1

Out of them, moisture representation of moisture, and dumping and hardness matrix of M, C and K building structures. X (t) .X (t) and X (t) are sequentially n * 1, high speed, volatility and homeless response vector. Applicable by F (T) power * vector * n * 1. If the application is with force frequency ω, then f (t) = F (ω) museum can be defined, where the F (ω) frequency domain has a vector intensity and is an imaginative unit. The random response of this structure can be described as X (t) = X (ω) museum, where there is an unprecedented response vector of the construction structure in the X (ω) Frequency domain. It is being considered that the sensor used for measuring structural reactions is an accelerometer; this study uses the frequency reaction function (FRF) in addition to the homeless FRF.

In this regard, equality (4.1) becomes formed

Or $(-\omega^2 M+j\omega C+K/ -\omega^2 x)\ (\omega)e^{j\omega t}=F(\omega)e^{j\omega t}$……………………....4.2

X(ω)=H(ω)F(ω)…………………4.3

Where, $\ddot{X}(\omega)$ is the acceleration response amplitude vector in the frequency domain is H(ω) is the FRF matrix of acceleration , defined as

$H(\omega)=((-\omega^2 M+j\omega c+k)/-\omega^2)^{-1}$ ……………………………………4.4

Assume that the structural damping follows the Rayleigh damping which can be expressed by C= αM+βK where, a and b are the coefficient sab out the first-or der and the second-order damp ingrates. Eq. (4.4) can then be written as

$(1+j\omega\beta)K\ H(\omega)=-\omega^2 I+(\omega^2-j\omega\alpha)MH(\omega)$ …………………….….4.5

Where, it denotes the n * n identity matrix.

The dynamic FRF-based model is an important step in producing a more representative original composition analysis model. The method of updating a vibration-based model according to a principle change, a structural modal parameter (such as damping or hardness master change). The use of model updating methods is also expanding to damage the structure. Measuring FRF vibration loss is in progress. In contrast to the natural frequency and mode formats, the measured FRF error provides more information than the natural frequency and mode format formed during the mining of modal factors. Therefore, FRF is preferred for updating models rather than natural frequencies.

The method of the model In order to increase and use Chen natural frequency and mode formats and dampers called semi-sliding friction, as shown in Fig. 4.1, braided built-in stiffness matrix and quality updates have been developed for a method to do. In addition to the control of these two states, a semi-active active friction casting machine is also used:

(1) The original building does not have any additional hardness (the clamping force is set to zero);

(2) Original building with additional stiffness (shock absorber in the bonded state). This idea was approved in this study, not the natural frequency and model size FRF model, and was therefore used to update a new method. Data for reference to semi-functional friction loss and vibration control was obtained for semi-functional active rubbing damage.

For the sake of explanation, consider the type of building, picture 4.1, where there are horizontal incentives on all floors (all fired). The extra hardness matrix participates in semi-functional friction dams used with buildings. Measure equation (4.5) to implement the elements in the FRF matrix H(ω) column H, easily apply the action motivation to the i^{th} layer, record the high-speed response on all floors, and then use the eq. 4.3 to get the element. We believe that the first state is that all collection forces in the dam will be set to zero, so the resin will not provide any additional stability to the original building. The original building's FRF matrix is used as a reference for application reference, Rayleigh damping such as αo and βo, where the subscript refers to the original building.

Equality (4.5) can be written out

$(1+j\omega_o\beta_o)\ \mathbf{KH}_o(\omega_o)=\omega_o^2 I+(\omega_o^2-j\omega_o\alpha_o)\mathbf{MH}_O(\omega_O)$ ……4.6

The new country was hall assumes all semi-active friction dampers are put in a sticking condition to create an additional Ka matrix of stiffness. Denotes the Added-Stiffness building FRF matrix as Ha, the frequency of the excitations applied as αo, and the Rayleigh mapping coefficients as αo and βo, where the subscription refers to the Add-Stiffness building. Yields by applying Equ.(4.5)

$(1+j\omega_a\beta_a)(\mathbf{K}+\mathbf{K}_a)\mathbf{H}_a(\omega_a)=-\omega_a^2\ \mathbf{I}+(\omega_a^2-j\omega_a\alpha_2)\ \mathbf{M}\mathbf{H}_a(\omega_a)$ ………4.7

Eliminating the unknown mass matrix M in Eqs. (4.6)and(4.7)yields:

$H_O^T(\omega_O)KH_a(\omega_a)=S$ ………………………4.8

Where,

$S=\{1/[(\omega_a^2-j\omega_a\alpha_a)(1+j\omega_o\beta_o)-(\omega_o^2-j\omega_o\alpha_o)+(1+j\omega_a\beta_a)]\}*[\omega_o^2-j\omega_o\alpha_o)\mathbf{H_O}^{\mathbf{T}}(\omega_O)-\omega_O^2(\omega_a^2-j\omega_a\alpha_a)\mathbf{H}_a(\omega_a)+1(1+j\omega_a\beta_a)(\omega_o^2-j\omega_o\alpha_o)\mathbf{H}_o^T(\omega_o)\mathbf{K}_a\mathbf{H}_a(\omega_a)]$ …………………………….(4.9)

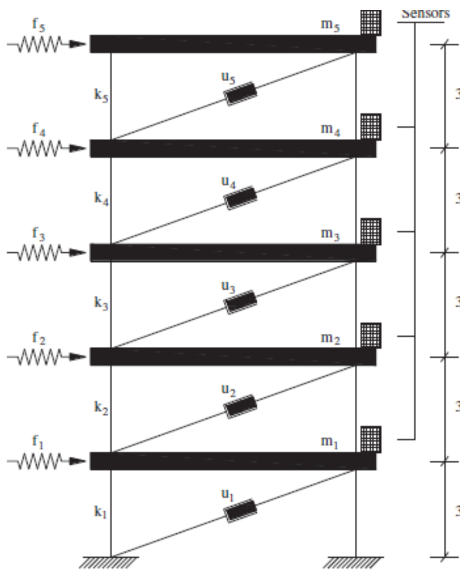

Figure 3. The example shear-building with semi-active friction dampers.

According to equality (4.9), Matrix S inspections can be determined by additional hardness matrix, original building, and FRF hit matrix of hard caravan. After that, you are re-written the hard work of Matrix K (4.8) without equality, equality (4.8) in the equality without converting RFF metrics so that as known as K column vector the following

AK =b ………………..(4.10)

Where

$\mathbf{A}=\mathbf{H}_a^T(\omega_a)*\mathbf{H}_o^T(\omega_o)$ ……………….(4.11)

$\mathbf{b}=vec(\mathbf{S})$ ………………………….(4.12)

$K=vec(k)=[k_{11}\ k_{21}\ \dots\ k_{n1}\ k_{12}\ k_{22}\ \dots\ k_{n2}\dots\ k_{1n}\ k_{2n}\dots\ k_{nn}]^T$..(4.13)

The Board has a Consumer Products cartel. The mark to organize the matrix into a column vector, which can include optional hardness (key = ij)> 1)) and its optimal matrix with multiple zero elements due to its connectivity. The built-in update information will be taken as a bad situation for the last rigid matrix. Mathematically, this can be achieved by eliminating Vector varieties and eliminating the columns of Matrix A. By doing this, Eq. (4.10) can be simplified

$\mathbf{A}^e\mathbf{K}^e=\mathbf{b}$ ……………………………………………..(4.14)

In which,

$\mathbf{K}^e=[k_{11}\ k_{21}\ \dots\dots\ k_{ij}\dots\dots\ k_{nn}]^T$ (abs(i-j) < 1) ………………..(4. 15)

AE (A) (K = = (abs (ij)> 1) is multiplied by removing columns that are obtained from A, thus, the size of the size N2 _ 1 Size range (3n-2) * 1 has been shown that equality (4.14) identities are found in addition to structural parameters, but there are elements of hard matrix. Therefore, address detected directly from equality (4.14) In this sense, a change is translated to solve the problem of matrix. For the construction of a granny, the horizontal date hardness is not known as the cocphytes Hardness categories (3-2) of non-corrosion elements potentially.

The relation between the horizontal story stiffness coefficients k_i (i = 1, 2,….,n) and the elements of stiffness matrix can be established as

$\mathbf{K}^e = \mathbf{T}\mathbf{k}^5$ ………………………..(4.16)

Where the vector $k^5 = [k_1,k_2,\dots k_n]^T$ is the horizontal story stiffness coefficient vector of the original building. The matrix T is the transformation matrix of size (3n -2)*n. The substitution of Eq. (4.16) to Eq.(4.14)yields the identification equations

$(\mathbf{A}^e\mathbf{T}^s)\mathbf{k}^5 = \mathbf{b}$ **………………………..(4.17)**

It is shown that the components of FRF Matrix H (ambiguously) and H (ambiguously) are in operation respectively undefined and vague. To identify the horizontal history difficulty, which Eqasks is. Specific frequency points (4.17) will be selected, but the overall frequency points will be selected. This spa offers great flexibility when it comes to identifying high quality. However, where the frequency of excitation is much higher than the building's natural frequency,

The values of the soft-heel elements in the FRF matrix are then very low to use parameters properly. It's always challenging to work and keep the community excited with a lot of pace. Therefore it is better to select the increased frequency near the first natural structural dumping frequency which is virtually unavailable. Assume that frequency D is chosen to identify the frequency of motivation. Someone can get equal equality. (4.17).

This equality creates a combination of

$\mathbf{A}_f\mathbf{k}^5 = \mathbf{b}_f$ ……………..(4.18)

Where

$\mathbf{A}_f = \{\mathbf{A}_1{}^e\mathbf{T}.\ \mathbf{A}_2{}^e \dots \mathbf{A}_d{}^e\mathbf{T}\}$ ……………..(4.19)

$B_f = \{b_{1.}\ b_2, \dots b_d\}$ ……(4.20)

Eq. (4.18) yields an over-determined problem, which can be solved by the least square optimization method to find the vector $k^5 = [k_1,k_2,\dots k_n]^T$.

V. Concluding & Future Scope

It provides a new work and is a modern means of detecting the lack of structural data, which involves semi-functional friction bounce and frequency reaction (RFF) functions. The sole FRF method of the new method FRF method and motivation is fully motivated according to the motivating conditions. Hence an experimental thesis used a five-story building as an example. Statistical tests indicate that one particular failure and harm to the buildings may be the way to measure the maximum FFF failure.

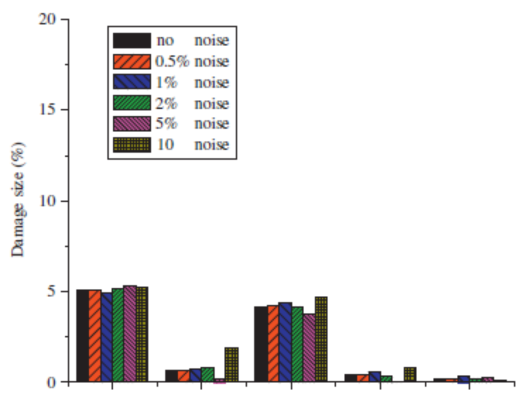

Figure 5: The damage detection results: 5 percent damage eat first and third floors (single excitation)

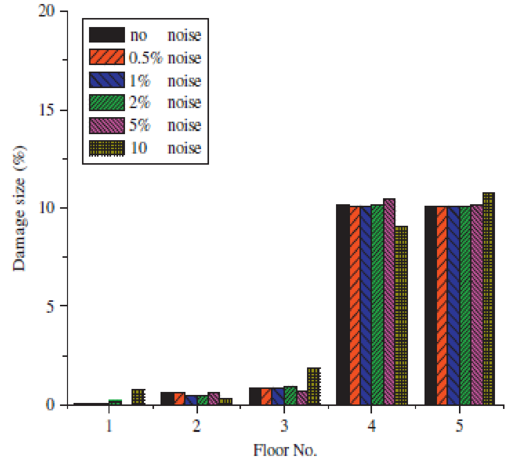

Figure 6: The Damage Detection Result: 10 Percent damage at 4th and 5th floors

The results of this figure also demonstrate that the way in which FRF losses are detected for the same behavior can be more harmful than buildings, errors and errors. Comprehensive judicial research further explained that the primary frequency can be accurately identified by the natural frequencies (NF) and the modality magnitude (MS).

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