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DAMAGE DETECTION AND ERROR PREDICTION OF SKY HIGH BUILDING

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I. SKY HIGH BUILDING

Skyline is a high-rise residential building with 40 or 50 stories high and approximately 100 meters (328 feet) long. Historically, the first term represents 10-20 storage buildings in 1880. This definition has changed with the development of building technology in the 20th century. Screw-screwers may include office, commercial and residential use. For 300 meters (984 ft) buildings, the term "ultra high" can be used, while the ski scrap is rated 600 meters (1, 969 feet) "over dated". A common feature of ski scrinter is the presence of a steel frame that supports curtain wall. The walls of these peripheral walls are being placed on the loading wall of a traditional building rather than the bottom frame or suspended.

II. LITERATURE SURVEY

M. Gutierrez Soto, H. Adeli (2013) it has been reviewed for a preliminary studies on exhibitions controlled by TMD in recent years. TMDs are divided into four types: traditional TMD, pendulum TMD (PTMD), double demonstration TMD (BTMD) and liquid column control dampers (TLCD).One of the traditional characteristics of TMD is a well established technology and is applied in many buildings, which has been introduced in the introduction, such as Table 101, including the old architecture. This is a drawback: it can only be adjusted to a specific vibration frequency, and this frequency will be affected by the uncertainty and even the change in strong earth movements.

Philip Oldfield, Dario Trabucco, Antony Wood (2009) although there are many types of high-rise buildings according to their functions, architectural style, height or strategic structure, they are rarely classified according to the factors that affect their energy performance: form of lighting, shape, appearance, location strategy, natural ventilation, etc. These factors are influenced by organizational changes, the development of technologies and materials, changes in architectural thinking and economic and commercial reasons. Developments such as the New York State Law of 1916, the post-war innovations in the curtain walls and the energy crises of the 1970s influenced the way that high-rise buildings were designed and operated at that time. These events also had a significant impact on the amount of energy and how they were consumed in high-rise buildings at that time. This paper examines the history of energy use in high-rise buildings from the origin of North America to the end of the 19th century. In this process, tall buildings are divided into five "chronological" generations according to their energy consumption characteristics.

L. Adelard, F. Pignolet-Tardan, T. Mara, P. Lauret, F. Garde, H. Boyer (1998), the proposed sky temperature is an important parameter for simulation symbols in construction studies.An initial campaign to verify the validity of this simulation program has shown that misinterpretation of long-wave radiological exchanges between the building and its surroundings indicates its misinterpretation. The literature research led to the use of models, use of dry air temperature to estimate the temperature of the sky. However, the models were not quite as satisfying as the night sky is pure. In this case, the state of the sky is still standing. Non-temporal studies were carried out, together with satisfactory results in sleep networks. The sky temperature is calculated and the injection code is injected. Simulation temperature comparison and measures have been turned to be acceptable. As the models need improvement, this measurement campaign continues. During the day and night, two separate networks are considered at this time.

III. NUMERIC AND INVESTIGATIONS

3.1 Description of an example building

The example of one of the current methods offered by Chen and Xu, used by Chen and Soi's building, is a sample selected in this study. The building is an equal height of 3 meters which is an example of simple five-minute sheets. The original building is one uniform mass meter = 5.1x 103kg and uniform horizontal hardness (crane) K = 1,334 x 102 N / five natural frequency of the original building is no added rigidity 2317, 6762, 10.661, 13.695 and 15.620 Hz. The matrix structural damping means that in the shape of Rayleigh damping, and it is assumed that buffer for the first and second order modes of building 2% relationship. In every story of the building, two adjacent floors installed a half-functional friction damper with a diagonal bracelet attached. High-speed reaction of the harmonic motivation building is measured by five speeds on each floor of the building to identify parameters and detect damages. The change matrix T is formed between them and the SS as follows:

$$\mathbf{T} = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & -1 & -1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & -1 & -1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & -1 & -1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & -1 & -1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}^T \quad \ldots\ldots (3.1)$$

All simulation cases consider 6 noise levels, 0, 0.5, 1, 2, 5 and 10 percent, respectively. All noises are included in high-speed response data. The noise surface is related to noise intensity which is described as a proportion between the square of square and high speed reaction between noise roots.

3.2 Selection of additional stiffness

In order to update the sample and to detect the damage, both the states must be born: The adjustment of the Kalping forces in semi-active friction dumpers at zero level will be originally constructed and will create colleting forces in the dams' dumps. To maximize the semi-functional friction, this value will create a building that has additional hardness provided by the harmful clip system. The stiffness ratio (SR) of the additional stiffness from the damper–brace system to the horizontal story stiffness of the building is defined as

SR=Kd/Ks………….. (3.2)

Where, the size of the SS building is harder and there is an extra difficulty of the DD Dumping clip system when the loss of semi-active friction is in the state. It is assumed that additional hardness and related SR used in this study are similar to all construction dates. For building vibration control with well-known hardness, the additional clip block of the clip system Kd should be selected properly to achieve the best control efficiency. Similarly, in order to detect the result and loss of the best system identification, the additional clause of the clip system should be improved. Average identification errors against the SR are plotting in photos with high levels and simple inspiration at high levels. The average identification error, for instance, is described as the average cost of five identification errors in the five geography of the horizontal hardness of the building. For the value of the SR and for the noise level, the method of the identification method applies to the construction of 150 frequency points, with more than five frequency points, with 0.1 frequency selections selected from FRF's building, 0.12207 hazards. Frequency If the horizontal density of the building is not enough to update the caffefites, which can make an average identification error. It can be seen that the value of the SM is less than 0.4 when the average identification errors can be rapidly decreased with an increase in SR for matters of full motivation and simple enthusiasm.

This is because the change of freight in the FRF is greater with noise measuring easily. As SMS values are more than 0.4, there are a slight change in average identity errors. For the full motivation issue, the average identification errors are less than 0.5% when the SR value is more than 0.4 and the proportion of hardness.

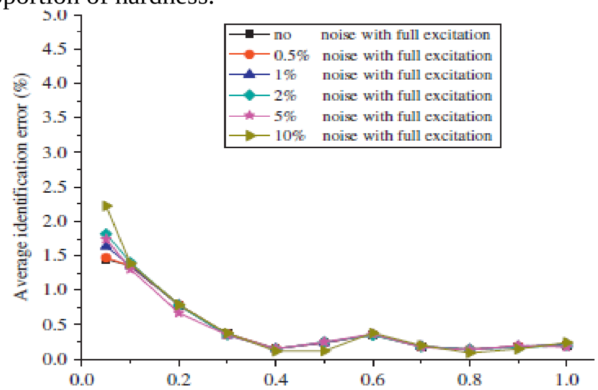

Fig 3.1. Average identification errors in story stiffness ratio (single excitation).

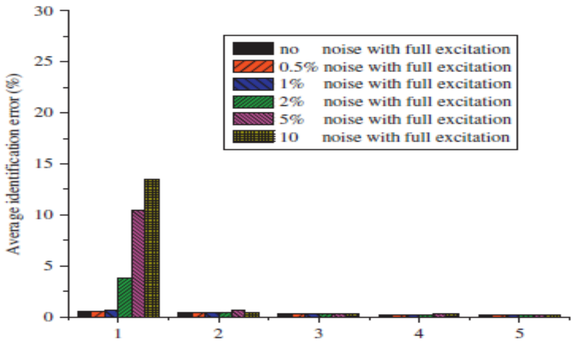

Fig 3.2 Average identification errors in story stiffness against the number of natural frequencies (full excitation).

The measurement noise does not affect the identification results. For the case of simple excitation, a higher measurement noise leads to a higher identification error, but the identification error is still less than 1.0 percent, even for a measurement noise level of 10 percent. Complete excitations give better identification results than the single excitation as expected. Based on the results shown in Fig above, the SR value could be selected as 0.4 but a value of 0.9 is selected for subsequent case studies in order to achieve the best control performance and compare it with the results given by Chen and Xu. Once the optimal value is found, the damping clamp systems are designed and manufactured according to the optimum value and finally installed in the building. As a result, the accuracy of the additional stiffness matrix Kd of the damping clamp systems can be well controlled, and in most cases no further identification is required in the field. The five natural frequencies of the building after an additional known stiffness with an SR value of 0.9 are 3,193, 9,322, 14,695, 18,877 and 21,530 Hz, respectively.

3.3 Effects of the number of natural frequencies

The proposed method is to identify the structure parameters and use a few frequency points in FCF, and use the ECC through the natural frequency of the building. Therefore, one of the key issues, how much natural frequency of this building should be considered to identify parameters. Since the building is difficult to increase the high frequency of the building, it is better to improve the natural frequency of the building. It shows average identity errors in the ration of the plant against the number of natural frequency.

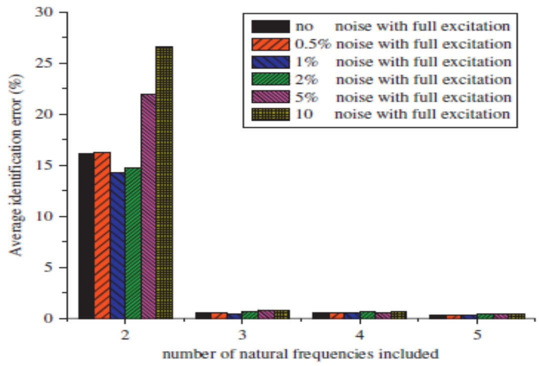

Fig 3.3 Average identification error in story stiffness against the number of natural frequency

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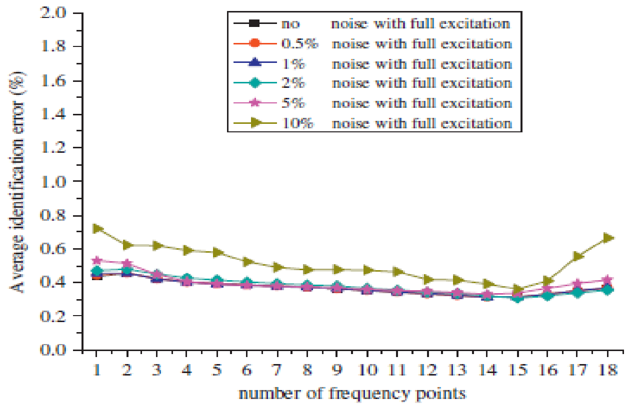

Fig 3.4: Average identification error in storey stiffness against the number of frequency points (Full Excitation)

With six levels of noise intensity, full motivation case and simple motivation case, respectively considered. In account, the SR price is set for all stories in the building for 0.9, and the frequency of 15 frequency points 0.12207 Hz is selected before and after every natural frequency in the interval Δf 4.6 See in mind that if a full motivation method is used, only two first natural frequency can be considered, maintaining the average identification error below 1% below.

Impacts of noise measurements on identity results are very small. If only the first natural frequency is considered and the level of measure is less than 2%, the identification results are still acceptable, but the measurement level does not increase, but the average detection error is very sharp. For simple motivation mechanisms, it is important to understand that at least the first three natural frequency measurements of the building should maintain a minimum error of less than 1 percent, without the main effects of the noise. As a result, for example study includes the first three natural frequencies.

IV. EFFECTS OF THE NUMBER OF FREQUENCY POINTS USED

After the natural frequency number, the identity of the parameter will be decided, and then a decision will be made before and after the frequency of the natural energy and how many frequency points are needed. Describe the number of frequency points as NFP. The fingers show the average identity error and the sole motivation in the severity of 4.8 versus 4.9, with intensity of 4.8 intensity, 4.8 and 4.9, strictly storing against NFP for complete motivation.

At that rate, the SR price is set at 0.9 for all story building and only the first three natural frequencies are considered. It can be seen in the full stimulus of 4.8 in excess of 15 PFN, through which the average identification error is at least. The effects of noise measurements on the identification results are not clear that the measurement noise level is higher than 5%. For the only motivating case, 4.9 show that the NFP will exceed 9 if the average identification error is less than 2%. Therefore, the 15 NFF is selected for the building.

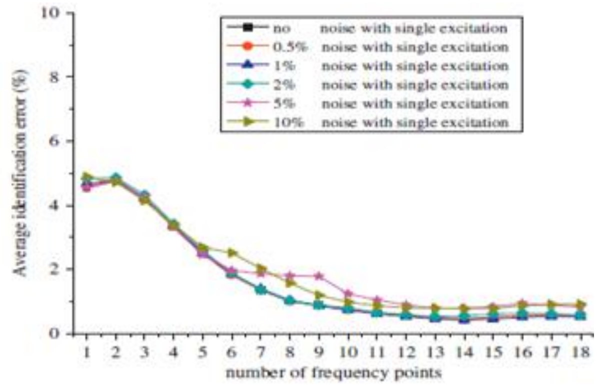

Fig 4.1: Average identification in storey stiffness against the frequency point

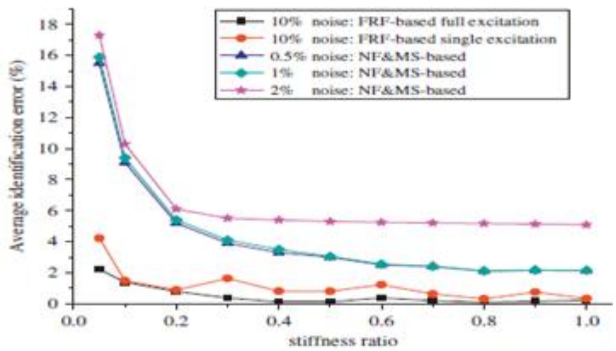

Fig 4.2: The comparison of average identification error between two methods

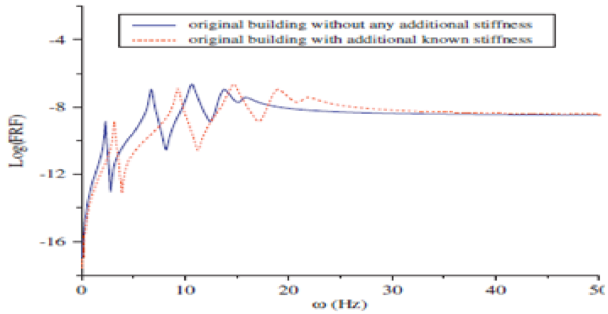

Fig 4.3:The FRF Curve of the top storey of building with and without stiffness

4.1 Comparison with previous study

For example, the parameters of the building are identified using the natural frequency (NF) and mode form (MS) as well, and the quality of its identification is based on the FRF. Strength ratio of this building varies by 0.05 to 1.0. Since NF and SS based method is noise measuring, 3 low noise levels are considered, so F0.5, 1 and 2 percent are considered, but for the FRF method, noise the level is considered. With a noise measuring 10 percent measurement noise 3 and then with the number of 15 frequency points. Statistics show the average identification errors in the hardness of platform by 4 methods in two ways. It can be seen that the identity errors of the FRF-based methods are smaller than the NF and MS-based method, although a 10% noise level is considered in the FRF-based method, but it is only one Is considered only Maximum noise levels of 2% in the NF.

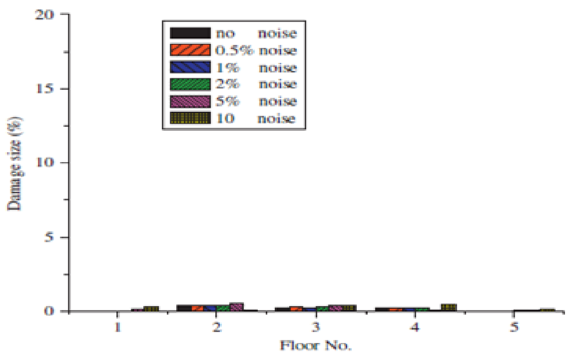

Fig 4.4: Damage detection results: without damage (Full Excitation)

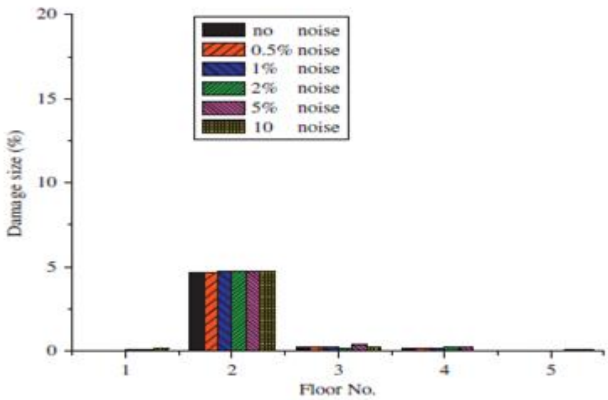

Fig 4.5: The damage detection result: 5 Percent damage at 2nd floor

This result is particularly true when the SR price is less than 0.4. When the noise level is more than 2%, the NF and MS based method cannot properly identify hard parameters. Therefore, it can be concluded that the FRF-based method is more accurate for identifying the building intensity by NF and SM based, and that noise measurement based on the FRF-based methodology more sensitive than NF and SS. In addition, using the FRF-based methodology SE allows relatively small to apply for NP and SS procedures for practical application facilities.

4.2 Damage detection using full excitation method

Five case of structural damage are considered in the example building:

(1) No damage;

(2) 5 percent reduction of the horizontal stiffness coefficient in the second storey of the building;

(3)10 percent reduction of the horizontal stiffness coefficient in the top storey of the building;

(4) 5 percent reduction of the horizontal stiffness coefficient in both the first and third stories of the building; and

(5) The decrease of 10% of horizontal scope in both the fourth and fifth floors of the building. For each issue of loss, the SR value is chosen as 0.9, the number of natural frequency is done as 3 and the number of frequency points is selected for 15. FRF frequency range is chosen from 0.5. 100Hz based high speed reaction data with frequency resolution. It shows the FRF so that no extra obstacle and without noise measurements apply to the height of the height and the height of the building on the upper floor of the building. Clearly it can be seen that with the maximum hardness, the natural frequency of the building increases and the top of the FRF curve moves towards the right.

Fig above without additional hardness without building identification and without any loss. Measurement noise level is considered to be zero from 10% different. Identification results show that there is no harm in the building. Two incidents of individual damage are compatible, 5 percent loss on the second floor and 10 percent loss on the second floor, and the results of the identification are shown in below. Again, two incidents of individual damage are well-defined, though the measurement noise reaches 10 percent. There are also two incidents of double loss and 10% loss on the fourth and fifth floors with 5% loss on the first and third floor. It show two outcome identities. Clearly, the proposed full-fledged FRF-based loss detector method is capable of detecting and quantifying multiple building losses with maximum error of less than 1%, but noise level 10 Percentage.

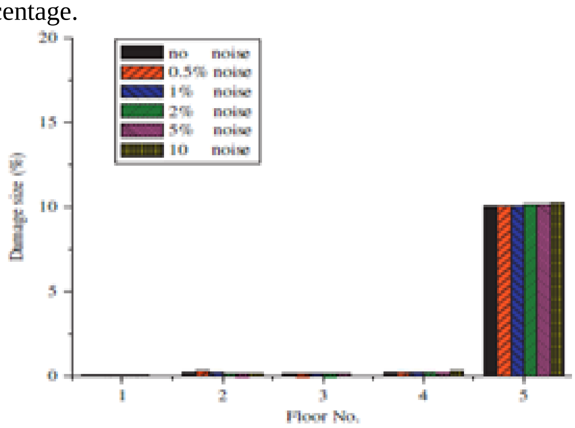

Fig 4.6: The detection result: 10 percent damage at fifth floor(Full Excitation)

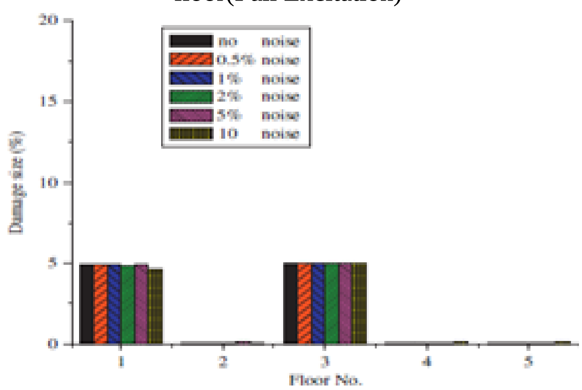

Fig 4.7 Damage detection using single excitation method

Investigations on five cases repeatedly repeated the loss of building construction using the only motivated method. All districts will be unchanged as a fully motivated case. Fig below shows the detection results of five loss events: lossless, with a loss of 5 percent on the second floor, with a loss of 10 percent on the fifth floor, a loss of 5 percent on the first and third floors and Fourth and fifth floors respectively with 10%.

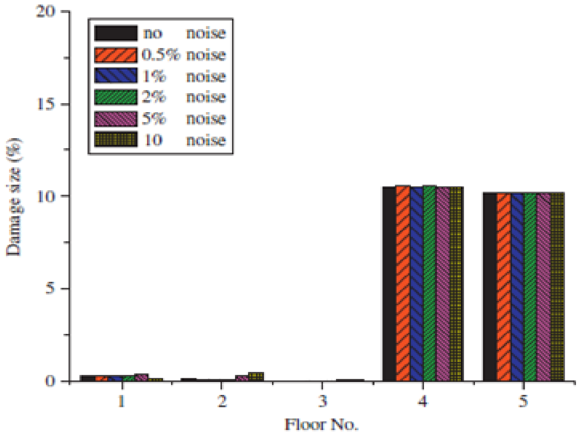

Fig 4.8: The Damage Detection result: 10 % damage at fourth And fifth Floor(Full Excitation)

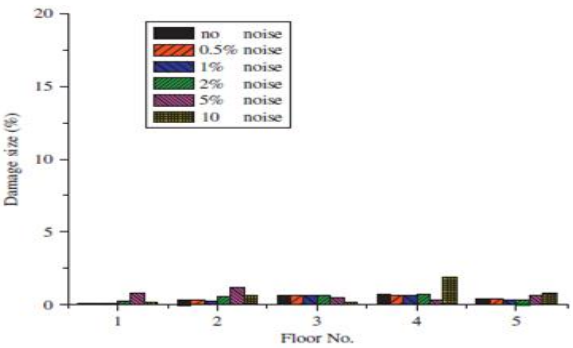

Fig 4.9: The damage detection results: without damage (Single Excitation)

The result shows that with only 10% noise level, the only motivated FRF loss detection method can find a loss. Maximum error is less than 2%. On the contrary, the overall detection method provides the FRF, which results in a unique motivation compared to the FRF loss detection method is more accurate, but practically FRF detection unit detection unit The procedure is sufficient for practical.

V. CONCLUDING & FUTURE WORK

It offers a new research and is a new way to detect the loss of details of construction structures, which includes semi-functional friction bounce and frequency reaction functions (RFF). According to the motivating conditions, the only FRF method of the new method FRF method and motivation is completely motivated. Therefore, an academic study was an example using a five story building. Statistics results show that the way to detect the full FFF loss can be a single loss and damage to the buildings. Although the noise level is [1, 2, 3, 4, 5, 5, 10] although the maximum error is still less than 1%. Damage Size (%) Floor Number Nursing 0.5% Noise 1% noise 2% Noise 5% noise.

Damage detection results: 5 percent loss as second floor (simple motivation) 1 2 345 05 10 15 20 Loss size (%) Floor noise 0.5% noise 1% noise 2% noise 5% noise 10 Noise 5.2, high 10%.

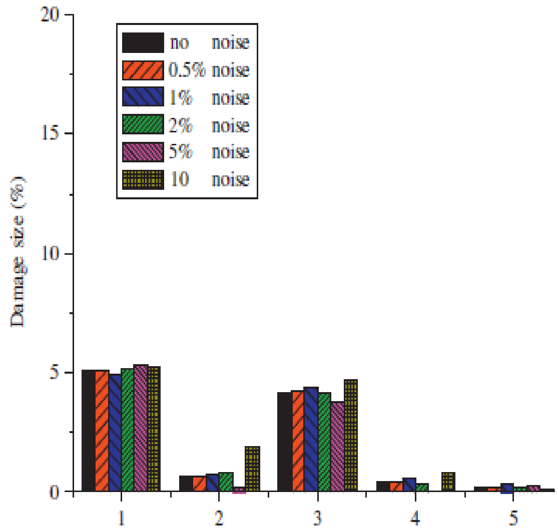

Fig. 5.1: The damage detection results: 5 percent damage eat first and third floors (single excitation)

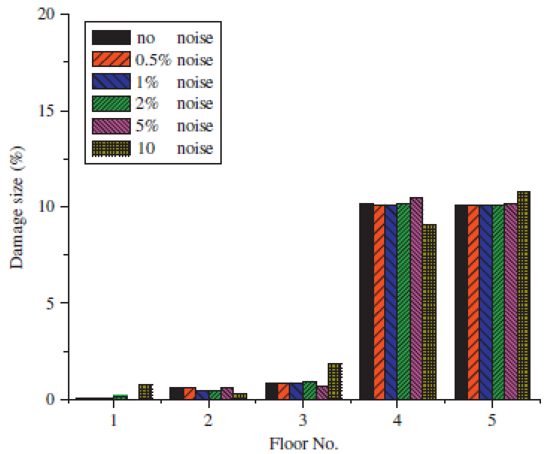

Fig 5.2: The Damage Detection Result: 10 Percent damage at 4th and 5th floors

Statistics results also show that the detection method for the loss of FRF based solely action can cause more damage than a building, with error and error. Comprehensive judicial studies further explained that the intensity of FRF-based methods and natural frequency (NF) and modal size (MS) can accurately identify the primary frequency, and that FRF is noise sensitive. This is based on measurement of NF and MS method. In addition, the FRF-based methods allow a relatively small hardness of NF and SS methods to promote practical applications. Prior to applying to real buildings, laboratory tests have been confirmed that the proposed method was necessary.

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