Analysis and Research on seismic technology in building structure design

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Abstract: In recent years, with the rapid development of China's social economy, the real estate industry has also ushered in a good opportunity for development. In the building structure, people pay special attention to its safety and stability. From the perspective of the causes of house collapse in China, a large part of it is caused by earthquake, which shows that there are still some deficiencies in the seismic capacity of the building in China. In order to effectively improve this situation, in the actual design of the building structure, it is necessary to comprehensively strengthen the seismic technology in the design of the building structure. The following article analyzes and studies this, and the main research direction is the current seismic measures and the main concept design.

1. Foreword:
Earthquake is a kind of common geological disaster in nature. It has strong destructive power and is difficult to predict in advance, which will bring great harm to people's life safety. House building is an important place for people to live, work and study. It not only ensures the stability of people's life, but also reflects the security of human life. In practice, in order to effectively reduce the damage caused by earthquake, it is necessary to further strengthen the application of seismic technology in the design of housing structure, so as to fully guarantee the safety and stability of housing construction.

As a kind of disaster with strong destructive power, the occurrence of earthquake is unpredictable. Even though it can predict the occurrence of disaster by some signs, it can not determine the exact time, so it brings great security risks to people's lives. The house is where people live, it not only brings people the stability of life, but also is a kind of guarantee for human life safety. In the structural design of the house, we should add some seismic technology to increase the safety factor of the house.

2. Seismic design requirements for building structure

2.1 Seismic design principle of building
For the design of building structure, it should not only be comfortable and beautiful, but also it have good functionality. The most important is safety, which can resist the corresponding natural disasters, such as rainstorm, strong wind, earthquake, etc. In the new era, with the rapid development of social economy, the design of housing structure is becoming more and more standardized and scientific, and more and more factors are considered comprehensively. When it carrying out seismic design, it is necessary to ensure that the housing structure has good stiffness, bearing capacity and stability. In the design process, it is necessary to adhere to the principle of strong joint weak connection, wall column weak beam, and strong shear weak bending. At the same time, in the specific design link, we need to remedy the weak link of the building structure, so as to improve the seismic performance of the
building as a whole.

2.2 Scientific increase of seismic defense In practice, in order to ensure that the building structure has good seismic resistance, it is necessary to choose a good ductility system, such as in the frame shear wall structure of the building, which is composed of ductility frame and shear wall. Since there are more than one earthquake after the earthquake, there are many aftershocks after the earthquake. These secondary disasters will also cause secondary and multiple damages to the building structure. Therefore, when carrying out the aseismic design of the building structure, it is necessary to appropriately add several anti earthquake defense lines in combination with the specific situation, so as to maximize the ability of the building structure to absorb and consume earthquake energy To improve the seismic performance of the building structure.

2.3 scientific planning of the relationship between the strength of building structural components
When carrying out the activities of building structure design, it is necessary to plan and deal with the relationship between the strength and strength of each component scientifically, so as to ensure that in the whole building, after the main energy consuming components yield uniformly, the other seismic components can still maintain good elasticity, so as to extend the effective yield time of building components and ensure the good seismic performance of the building. At the same time, for the existing relationship between the strength and weakness of components, it is necessary to adjust in time after finding unreasonable places, so as to avoid that it is difficult to obtain good seismic effect in later operation and use.

The design principle of "strong column and weak beam" is put forward in seismic code. The essence of "strong column and weak beam" is to control the position of plastic hinge in the frame, so that the energy dissipation plastic hinge which will not cause the overall damage of the structure should appear earlier and more at the beam end. Under the earthquake action, the plastic hinge in the frame may appear on the beam or on the column: the plastic hinge in the middle of the beam will lead to local damage; the plastic hinge in the column is not easy to repair and easy to cause the overall damage or collapse of the structure; The plastic hinge appears at the end of the beam, but it can make the structure deform greatly before failure, absorb and dissipate more seismic energy, so it has better seismic performance.

3. Application of seismic technology in the design of building structure

3.1 Application of isolation layer and inverted pendulum
This technology is mainly used in the connection between the building foundation and the main body. After the earthquake, it can help the main structure absorb the earthquake energy in time and reduce the damage to the main body of the building caused by the earthquake. In the process of building structure design, some designers tend to carry out the reverse pendulum design on the top of the building. Its main function is that after the building is affected by the earthquake, the center of gravity will shift to the opposite direction, so that the building will not be greatly damaged when it is affected by the earthquake. So the inverted pendulum has a good damping effect, it will provide a reverse acceleration for the building from the direction of motion, offset the seismic energy, practice has proved that the isolation layer and inverted pendulum have good seismic effect.

3.2 Longitudinal design layout
In the design of building structure, the plane design of building wall and beam column is one of the important factors that affect its aseismic ability. Therefore, in the longitudinal layout design, we should avoid the situation where the head is heavy and the foot is light. At the same time, we should reduce the center of gravity of the building as much as possible, maintain the good rigidity and strength of the longitudinal structure, and ensure the uniform stress. In the structural layout, the designer should ensure that there is no unscientific place in the design scheme. If there is any
unreasonable design content, it should be remedied in time. In addition, in the design process, we can also make a good division of the internal structure of the building, and appropriately increase the seismic joints, so as to improve its seismic level.

3.3 steel structure design
The actual stiffness of the building itself is an important index to judge its seismic capacity, so it is very important to do a good job in steel structure design. In the design process, the designer needs to comprehensively consider the materials used in the building construction, such as cement grade, steel strength, etc., especially the double-layer reinforced structure.

3.4 application of damping technology
In the design of building structure, designers can protect the important parts of building structure by adding damping elements and equipment. It needs to be noted that the construction personnel must be required to operate in strict accordance with the relevant requirements during the construction process. The damping element can play a strong role in the key structure of the building. After the installation, it is necessary to check it carefully and do a good job in strengthening, so as to ensure that the internal structure of the building is in a stable state. When selecting damping elements, it should be combined with the specific situation of the construction project to ensure the applicability, economy and safety of each other.

3.5 application of isolation device
In the design of building structure, in addition to the isolation layer at the connection between the foundation and the main body, the designer can also add some devices with isolation function in the building structure, which can greatly improve the vibration period of the building structure, and effectively weaken the energy from the bottom to the top of the earthquake when there is an earthquake disaster. When choosing the isolation device, we must ensure its quality is good, and we can't choose the inferior isolation device because of the project cost, which will greatly reduce the seismic performance of the building.

3.6 improve the seismic capacity of the house
In the design of building structure, designers should also consider the actual situation of the building structure itself, pay attention to the firmness of the building body, and try to reduce its weight, so as to alleviate the building's force on the foundation. In this way, after an earthquake, the foundation can have more ability to resist the adverse effects of the earthquake, and reduce the impact of the earthquake on the main body of the building. At the same time, we should strengthen the compaction of the foundation to ensure that the foundation can play its due role after the earthquake. In addition, it is also necessary to ensure the unity of the integrity and spatial structure of the house. In many cases, the main structure of the house will break down due to its uneven stress, so it is also necessary to improve the seismic performance of the house structure from this aspect.

4. Conclusion
A large part of the damage caused by the earthquake to the building is due to the poor seismic capacity of the building itself. Therefore, in practice, we must pay more attention to the seismic design of the building. We should select a feasible seismic design scheme in combination with the specific situation of the building project and the structural design, so as to maximize the promotion of the building. The seismic performance of the building structure can ensure the safety and stability of the building, reduce the damage of the building caused by the earthquake, provide security for the life and property of the majority of residents, and lay the foundation for the harmonious development of our society.

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