Seismic Response Analysis of Composite Structures

Xingwei Sun

School of North China University of Science and Technology, Tangshan 063210, China.

18233184782@163.com

Abstract

composite structure buildings seismic has been the focus of the design and construction, to attain to reduce and avoid engineering construction real earthquake disasters, to grasp the good seismic design is the basic measures to mitigate earthquake disasters, the aseismic necessary theoretical analysis, thus to explore the combination of architectural design methods and necessary aseismatic measures

Keywords

Composite structure, earthquake.

1. Introduction

Composite structure buildings seismic has been the focus of the design and construction, to attain to reduce and avoid engineering construction real earthquake disasters, to grasp the good seismic design is the basic measures to mitigate earthquake disasters, the aseismic necessary theoretical analysis, thus to explore the design concept of high-rise buildings, the method to take necessary aseismic measures [1].

2. Organization of the Text

The research and application of combinatorial structure in China began in the 1980s. Over the past 50 years, the research and application of composite structure have been developing rapidly. Up to now, it has become a new structure system, which is parallel with the four traditional structures, namely steel structure, wood structure, masonry structure and reinforced concrete structure. Specifically, there are two structures: 1. Composite structure of steel and concrete; 2. Composite masonry structure.

In recent years, domestic and foreign scholars have conducted a lot of studies on the fire-resistant properties of reinforced concrete beams:

Heilongjiang August first land reclamation university college of engineering Yang guang [2], Heng-Yan Xie, zhao-qiang zhang, Xue Hui, TaoChuan removed by shaking table test as a means of verification, analyze the structure design and evaluation, come to a conclusion: tall hybrid structural system construction in the absence of basic seismic data and cases, over the existing specification limit preliminary structure design combined with model shaking table test data validation is the tall mixed structure building structure design of a kind of effective way. However, the shaking table test structure is only applicable to qualitative analysis, and the quantitative analysis needs to be further studied.

Guo ningsheng of yinchuan planning and architectural design research institute co., LTD. [3] studied the seismic evaluation and reinforcement of steel-concrete composite structures and came to the conclusion that the steel-concrete composite structures are in It shows great advantages in the aspect of earthquake resistance, but there is a big gap with the actual demand. Due to the limited ability of individuals, coupled with the complexity of the seismic assessment and reinforcement of steel-concrete composite structures, the relevant research in this paper may have some deficiencies. It is necessary for industry colleagues to participate more in the relevant research, and further optimize the seismic assessment and reinforcement method of steel-concrete composite structure based on the

current technical process, and put forward corresponding implementation strategies, so as to provide people with a safe living environment.

Architectural design institute of tongji university (group) co., LTD. Billy [4], structural engineering and disaster prevention research institute of tongji university xiao-song ren, king fung to adopt concrete members reinforced add after a secondary masonry buildings aseismic capacity analysis through calculation analysis can be found: (1) add concrete member after reinforcement method can greatly improve the seismic resistance of the original masonry structure; Under the action of different seismic levels in the mass of the earthquake, the post-concrete members all play the role of sharing the horizontal seismic load and increasing the integrity of the structure. The joint components designed by Mr. Wang have good connection performance, which meets the requirement of working together with the original masonry structure. The feasibility of the proposed design method is verified by studying the displacement Angle, displacement and other indicators.

Wu tao [5], school of civil engineering, anhui university of architecture, and wei renwei, school of civil engineering, university of London, used SAP 2000 finite element structural analysis software to establish linear 3d models of the structure, and respectively analyzed the combined structure model with supporting layers and the combined structure model without supporting layers. By comparing the data of natural vibration period, floor displacement and interlayer shear of the two structures in modal analysis and modal response analysis, the relevant conclusions are obtained. The results show that the seismic performance of the composite structure is better than that of the composite structure.

Du literature [6], research institute of engineering mechanics of China seismological bureau, put forward the overall seismic performance of the mixed structure system and the anti-lateral capability of the core barrel of the built-in steel frame, which is the main anti-lateral part, and discussed the feasibility of this kind of mixed structure in the (super) high-rise building structure, especially in the earthquake zone.

Ling Yang vocational college construction engineering branch light kay [7] according to the seismic risk level and structure seismic performance level, to determine the seismic fortification target RCS composite frame structure, and to quantify the fortification target, proposed RCS composite frame structure under different performance levels of interlayer displacement Angle limit.

3. Conclusion

From the above research results, we can see the problems existing in the current seismic design analysis: the limitation of the application of acceleration design response spectrum to seismic design.

1. The existence of strong earthquake ground motion composition for a long period of seismological research and strong earthquake observation proves that the earthquake cases, a definite ground motion component for a long period of time, the cycle can be up to 10 seconds, or even 100 seconds, earthquake magnitude from phase 5 to 8, the spectral values in 10 seconds in the biggest difference not more than 50 times, in the 100 s cycle, no more than 250 times. At magnitude M>5, the period is less than 3 seconds, and the signal-to-noise ratio is large enough to meet the engineering requirements. It is also proved that the spectral curve has at least two corner periods.

2. Loss of long-period components in existing records of strong earthquake acceleration

Due to earthquake gauges recorded frequency response range limit not more than 10 seconds of ground motion components, also exist in more than 5 seconds component distortion, and in the process of acceleration records for error correction will be digital filter out the noise produced by zero correction at the same time also will go to the long period components of ground motion filter.

3. The secondary attenuation of the long period of the acceleration response spectrum

The response spectrum theory proves that the acceleration response spectrum curve has three control sections, namely, acceleration, velocity and displacement control, the designed response spectrum "platform section" is the acceleration control section, the speed control section is attenuated in the form of t/t, and the displacement control section is attenuated in the form of 1 / T2. This has become

a common sense in the field of seismic engineering. However, the real practical problem is that the spectral value of the long period is too small and has no control effect on the seismic design. Therefore, national norms have been revised to varying degrees.

4. Delay and delay in response to seismic acceleration of long-period structures

For a long-period structure with a period of more than 3 seconds, the response of the structure is relatively slow and delayed due to the short period of the ground acceleration due to the high value of the accelerometer.

References

[1] Yu-Xun Wang. Composite structure building [D]. Fuzhou: civil engineering college of Fuzhou university, 2010:1-8.

[2] Guang Yang, Heng-Yan Xie, Zhao-Qiang Zhang, Hui Xue, Chuan-Qian Tao. Experimental study and progress of seismic performance of super high-rise hybrid structures [J]. Heilongjiang science and technology information,2017,(11):227.

[3] Ning-Sheng Guo. Seismic assessment and reinforcement of steel-concrete composite structures [J]. Residential and real estate,2017,(05):153.

[4] Bin Zhou, Xiao-Song Ren and Xian-Yu Wang. Analysis of the seismic performance of an existing masonry structure reinforced with post-concrete components [J]. Engineering seismic resistance and reinforcement renovation,2017,(01):128-134.

[5] Tao Wu, Ren-Wei Wei. Seismic performance analysis of composite structures [J]. Journal of Chengdu institute of technology,2016,(04):9-11.

[6] du literature. Experimental study and analysis of the seismic performance of the reinforced concrete core tube of the reinforced concrete frame with internal steel frame [J]. International seismic dynamics,2016,(03):47-48.

[7] Kai Xian. Study on seismic performance indexes of RCS composite frame structures [J]. Journal of Ling Yang polytechnic college,2016,(01):19-23.