

Numerical Simulation of Building Collapse in Complex Environment

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Abstract: With the development of science and technology and the increasing number of buildings in the city, the demolition and blasting of old buildings should be carried out with a scientific and reasonable design of blasting calculation. Only after a simulation of the collapse value of the buildings can they be effectively guaranteed to be in such a complex environment today. As a result, it is very necessary to carry out a numerical simulation calculation before blasting. The engineering side can use a lot of advanced computer network information technology, and a lot of excellent BIM technology software simulation system to help the comprehensive numerical simulation calculation of all kinds of effects on the construction plan to be blasting before actual blasting, so as to achieve a preview of some possible events that will occur in the face of actual demolition blasting of buildings, Then it can safely complete a budget for the whole process from the initial design of demolition of the old building to the collapse of the components after the demolition of the building. so as to improve the blasting design scheme of the building before blasting. This paper analyzes the theory of controlled building blasting and shows the importance of numerical simulation before blasting.

1. Introduction

As far as the present situation is concerned, the technology of blasting demolition of old buildings and controlling blasting track has been widely used in the demolition of old buildings. The demolition of old buildings that require demolition by blasting, such as the chimney tracks in the buildings and the water tower parts thereof, which are within the buildings of the enterprise, makes it relatively difficult to demolish, and it is precisely because many normal buildings that are still in use are still in the vicinity that the demolition is more difficult, and with the old and unused buildings in the enterprise that are going through a process of self-destruction, and the degree of this is increasing, so many old buildings have already become many high-risk buildings. Therefore, in view of this situation, it is very important to improve the blasting demolition of these dangerous old buildings and to ensure the safety and reliability of their collapse. Therefore, in order to improve the safety and reliability of the old and dangerous buildings in the process of blasting demolition, it is necessary to take into account the collapse direction of these old buildings and the safety distance between them and other buildings in normal use when they are being demolished, the height of the accumulation of waste construction waste caused by the demolition of the blasting, the vibration caused to the ground, and the concrete form of the disintegration of the old buildings when the project is carried out. There are also a variety of factors, such as the disposal of hazardous substances after blasting, so in order to prevent the demolition of buildings during the process, there are some unexpected possibilities, such as the collapse of buildings did not follow a specified direction when the collapse or the collapse time has passed no movement, even after the blasting still stand in danger and some of the blasting size of the gravel derived from random flying, resulting in the normal use of buildings around a man-made accidental damage, or even cause a casualties of an accident. So it is necessary to simulate the collapse of buildings before blasting, which can avoid many unnecessary damage and damage [1]. However, it is obviously very difficult

and impractical to make a complete calculation and analysis of these complex technical problems, such as the direction of dumping, the form of disintegration of the building structure and the vibration of the ground, in one theory, so it is necessary to optimize the scheme of blasting by repeated computer information technology simulation analysis, compare the parameters in the design of demolition, and carry out repeated verification calculation. As a result, many of the current engineers will use the BIM technology in the computer to carry out the collapse simulation before the demolition of buildings, reduce the occurrence of unexpected results during the demolition of buildings, thus reducing the cost of blasting and the occurrence of casualties.



Figure 1 Building collapse map

2. A Present Situation of Domestic Blasting Demolition

After China's reform and opening up, with the continuous construction of the national economy and continuous development, construction reconstruction and engineering expansion in many parts of our country is also increasing, so the annual task of blasting demolition of old buildings is also expanding.

By the end of the 20th century, many mature blasting workers in our country have made a processing and finishing of the control design scheme of blasting demolition on the basis of carrying out a lot of practical experience, and on this basis have summed up many experience calculation companies in blasting. These practical examples of engineering and the calculation formula of the experience of mature blasting workers have brought great help and reference to many later projects. Later, after entering the twenty-first century, some structures of the demolished building objects and the blasting environment, as well as the strict requirements of the staff, have undergone a relatively great change [2]. In the past, the experimental results of many blasting personnel and the study of the observation data in the field for many years, as well as the theoretical empirical formulas, have long been unable to meet the needs of blasting demolition in a practical practice of modern construction engineering. In order to improve the safety and possibility in the process of blasting demolition, it is necessary to combine theory with practice and analyze the changes synchronously.

3. Main Problems of Building Collapse in Complex Environment

3.1 A series of detailed theoretical studies on the blasting control of many old buildings is not sufficiently thorough. Previous empirical formulas for the design of the main blasting demolition can no longer be applied in real terms to the direction and timing of the entire safety process of the collapse of buildings in complex environments, and may even have many serious uncontrollable consequences.



Figure 2 Blasting plan for building collapse

3.2 Most of the studies on the numerical simulation of buildings in complex environments tend to be directed towards the process of collapse of buildings, but the analysis of the impact of internal forces on buildings in the process of collapse, as well as on the impact of buildings in normal use around them after blasting, is clearly insufficient to form an effective auxiliary design tool for the design of building blasting schemes.

3.3 It is not enough to study the effect of the vibration on the ground caused by the collapse of an old building to the ground in our country, so we can not accurately grasp the actual situation of the structure on the ground caused by blasting demolition.



Figure 3 Building collapse map

4. Matters Needing Attention in Blasting Construction

4.1 A detailed inspection of the supporting part of the building is to be carried out in order to prevent the weakening of the supporting function during blasting due to the building characteristics of the flue, and then to prevent the downward positioning of the flue during the demolition initiation, which eventually leads to the failure of the blasting demolition plan for the flue.

4.2 Before blasting charge, the size of the hole should be checked strictly, and some corresponding measures should be taken to remedy some holes which do not meet the requirements of blasting.

4.3 In the process of blasting demolition, a series of strict protection measures should be carried out to avoid some unnecessary damage before blasting in some high buildings with severe weathering damage.

4.4 A removal of the chimney's interior is required before the chimney is demolished by blasting, and the remaining water tower is discharged to a clean surface before the tower is demolished to ensure that damage is reduced during the process of building collapse.

4.5 A series of protective measures should be taken on the ground in the direction of the collapse, such as laying a thick layer of soil on the ground or covering a thick layer of grass, to reduce the

occurrence of linkage hazards when the building vibrates opposite it after demolition.

4.6 If, on the day of blasting, the weather conditions are not conducive to the operation of blasting demolition, then the demolition works should be properly postponed to avoid the occurrence of man-made incalculable damage.

5. Summary

To sum up, with the enhancement of our comprehensive strength, the demand for demolition and blasting of old buildings is increasing. Although the experience of blasting demolition in our country has become more and more mature, in the face of actual blasting site, we should give priority to the calculation of computer information technology software. So it is necessary to carry out numerical simulation calculation before the collapse of a building.

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