Modification and Characterization of Raw Soil-based Materials

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Keywords: Raw Soil-Based Materials; Material Modification; Characterization Analysis

Abstract: In the development of China's construction industry, raw soil has always been one of the most important building materials. For a long time, China's construction mainly used raw soil, but the raw material of this material has its own performance. It will directly affect the safety, durability and circulation of the building. It should analyze the performance of the soil-based materials and improve its mechanical properties to promote the new soil-based materials for the contemporary architecture. Vitality makes the earthen building conform to the actual requirements of the contemporary people for the building. At present, there are still some problems in the research on the modification of raw soil-based materials in China. Only by solving these problems one by one, we can find some problems in the soil materials and related buildings to help the soil-based materials at present. Better use in the building. At the same time, it will extend the life and durability of the soil-based building and promote the further improvement of urbanization in China.

1. Introduction

The so-called raw soil refers to the undisturbed earthen material which has not undergone any modification treatment and is only obtained by simple processing. This is the most common building material. It is not only widely used in China, but is also widely used worldwide. As one of the most traditional building materials, it is a common practice to build buildings using raw soil. Since the raw soil material can be returned to nature directly after a certain period of service, or it can be recycled and reused after processing, it has a very positive impact on environmental protection. Promoting a sustainable society and environmental protection, the use of raw soil-based materials can better make construction projects meet the environmental requirements of China. The raw material itself has better thermal insulation performance, strong gas permeability and no pollution, which can create a more comfortable indoor environment for human beings. However, if traditional raw materials are used, a series of problems will occur, such as raw materials [1]. When used, it is found that the soil is easily deformed, the water stability is poor, and there are certain defects in earthquake resistance and frost resistance. To this end, how to improve the raw materials at present is one of the important directions for the development of the construction industry.

2. Problems in the Modification of Raw Soil-Based Materials and Their Characterization

At present, although China recognizes that earth-based materials are very friendly to social development and environmental development, there are still a series of problems in the research on modification of this material [2]. Only in-depth research and analysis on these issues can be made. Relevant suggestions have prompted the soil-based material to be effectively applied in buildings and to make positive contributions to the development of our society, including the following three issues:

2.1. Change the performance of soil-based materials

The traditional earth-based materials are an ideal green building material for the current development of the building. They can be recycled to nature and can be reused twice, in line with China's requirements for sustainable buildings, but the soil foundation. This material has its own shortcomings, such as low strength, poor water stability, and large shrinkage at different

  DOI: 10.25236/iclcea.2019.015

temperatures, which can lead to the construction of buildings using raw soil-based materials. The life span is relatively short, and the stability of the building is low when the building is applied, and it is very susceptible to wind and rain or freeze-thaw cycles, which in turn causes damage to the building as a whole. For this reason, if the construction of the soil-based materials is directly used for construction, the life of the building will be relatively low and it will not be earthquake-resistant. It is difficult to meet the actual needs of the society in the current society. Only a certain fiber and inorganic condensation are added to the raw soil-based materials. Different materials and other building materials can be modified to ensure the soil-based materials. The application can be used to extend the life of the building. However, if too much material is added, it will affect the raw materials. It has the property of recycling availability. In view of this problem, it still needs to be analyzed, and it is necessary to change the restrictions imposed by the soil-based materials on the current social development. The advantages of the soil-based materials are preserved and their disadvantages are changed.

2.2. Economic costs continue to increase

At present, in the construction of soil materials, it is mostly used in rural areas. For this reason, if the soil material is modified, too many varieties are added or the content is too much, which will make the price of the earth material constant. rise. It directly affects the cost of the raw materials itself and the cost of the raw soil construction, making it difficult for the soil-removing products to be used more widely in rural areas, and also promotes the soil-based materials themselves to be limited and affected.

2.3. Lack of uniform standards

Because of the vastness of China's vast land, for the study of raw materials, there are certain differences in the raw materials used in different parts of the country, whether it is the soil composition or the nature of the soil itself. To this end, it is necessary to dope different modifier types according to the actual conditions of different regions, and also have different requirements for the doping amount. Once the doping amount is the same, the difference is The impact of the raw materials is also different. It is difficult to quickly form a uniform standard and specification of raw soil in China in a short period of time, which makes the soil material have certain geographical restrictions when it is modified. Geographical restrictions have also made it difficult to use widely used materials in China's construction.

3. Research on the Modification Technology of Raw Soil-Based Materials in China

Different from some developed countries in foreign countries, China's research on raw soil-based materials is relatively late, but with the rapid development of society, some relatively obvious progress has been made in the modification of raw soil-based materials. Different researchers have analyzed the soils in different regions and modified them to obtain certain research results, including the following research results.

A certain proportion of straw, quicklime starch and slaked lime were added to the raw soil base to modify it. After extensive experimental research, it was found that the shear strength of the whole soil was modified by the method of modifying the soil base. The water resistance has been effectively improved, but the results are also different when different amounts of modified materials are added to the raw soil-based materials. Among them, the addition of different admixtures for raw soil has the effect of self-shearing strength: when 3% of straw is added to the raw material, the shear strength is the best, but if 3% of straw is added, the raw soil-based material The early water resistance effect is generally close to that of the raw soil itself. However, due to the faster water immersion rate of the raw soil-based material itself, the water resistance is not as good as the raw material itself. When 7% of starch is added, the shear strength of the green soil is better, more than 3% of the quicklime, and also greater than 5% of the slaked lime added to the raw soil. Adding 7% starch to the raw soil, no matter whether it is the early water resistance of the raw soil-based material or the later water resistance, it is stronger than the raw soil-based material, and the water

resistance of the straw soil sample is 3%. Also strong.

Adding a certain amount of cement, clay, foaming agent and other additives to the reclaimed soil-based material, and making it into raw soil foam concrete, can also be used in construction, and research on this soil quality, the results show that The doping amount of foam in the soil foam concrete is different, and the characteristics of the soil are also different. The higher the foam doping amount, the lower the apparent density and compressive strength of the foamed concrete. For this reason, the thermal conductivity of the green foam concrete is also reduced, which promotes the thermal insulation performance of the foam concrete itself. However, in the raw soil foam concrete, the compressive strength of the green foam concrete itself will vary with the amount of microsilica added. When the amount of microsilica is increased from zero to 15%, it can be found that the soil foam concrete has a very significant improvement in its own compressive strength. When dry and wet experiments were carried out on raw soil foam concrete, it was found that when the overall humidity in the air is lower than 70%, the raw soil foam concrete has a better gas permeability machine, which can not only improve the comfort of the house during use, but also The service life of residential buildings is increasing, which is in line with the actual requirements of buildings in China.

Adding different amounts of cement to the raw soil, as well as different modifiers such as single and double lignin, improve the soil. It can be found that the rheological properties and compressive strength of the raw material itself will change accordingly, and when the modified material is modified, when the rotational speed is 30.02r/min-200.01r/min, the rotational speed is used. With the continuous increase, the viscosity of the soil slurry will change to some extent. If the speed is kept between 30.02r/min and 200.01r/min, no water-reducing agent will be involved in it. The clay of the soil mud is difficult to increase or decrease, and remains in a state of constant change.

Selecting single-mixed and double-mixed in the soil material, adding a certain amount of cement, fly ash and slag to the soil material, and modifying the soil samples, it can be found that these materials will be produced. The mechanical properties of the soil material itself have different effects. After a large number of experiments, when the raw material wall material is mixed with 5% to 12% of the admixture alone, the different blending amount will be the raw wall. The effects of the bulk material itself are different. For example, cement has better resistance to compressive properties and flexural strength of raw materials, but mines, fly ash and modification effects are different. Compared with slag, fly ash has the most modification effect. Poor, it has certain fluctuations on the compressive and flexural properties of the raw material itself, and its effect is not stable. If the composite material is selected, the compressive strength and flexural strength of the raw material are analyzed. It is found that the overall improvement is better than that of the single-doped admixture, and the effect of adding cement is the best for the overall improvement. It can be found that both the single-mixing or the compounding can make the raw wall material and its own shrinkage have Very noticeable reduction. However, with the use of complex doping, the overall inhibition effect and performance change are among the best.

Adding a certain amount of cement, quicklime, fly ash, etc. to the raw soil-based material, and treating the sediment of the Yellow River Basin with the treatment of sodium hydrogen sulfate, it is possible to find two different processes of vibration molding and press forming. It will also have a certain impact on the different properties of the soil material itself, such as mechanical properties, durability, etc. Through a large number of experimental studies, it is found that if the molding pressure is gradually increased from 10MPA to 40MPA, it will withstand pressure over time. The strength and softening coefficient assume different states. After 3d, 7d, 28d and its own performance will be gradually increasing trend, but if this way, the water resistance of the soil-based material itself can not meet the actual use standards of China's buildings. If vibration molding is used, it will be found that as the water-solid ratio increases, the compressive strength and the softening coefficient will be in this reduced state. If the overall water-solid ratio is lower than 0.22, the modified soil-based material and its own softening coefficient are larger, and have been greater than 0.7, which can only meet the lighter moisture, or the water resistance requirement in the secondary structure. For most of our buildings, we can't meet our own water resistance

requirements, but because of the large amount of gel in the micro-structure of the vibration forming, the water stability is relatively strong, compared with the press forming, the vibration molding is on the water. It has its own unique advantages in terms of stability.

4. How to Better Improve the Soil-Based Materials

In order to better make the soil-based materials, it can be used in the current construction. It is necessary to continuously improve the different admixtures incorporated in the materials of the earth-moving machine. For this reason, the following methods can be used to continuously change the raw materials. The use effect of soil-based materials, while meeting the performance of the soil-based materials, will not change too much, so that the soil-based materials always conform to the environment-friendly society: First, when modifying the soil materials, you can use Degradation of the same non-toxic organic matter to modify the soil material, so that when the soil material is discarded, it can directly return to nature, that is, it will not cause damage to the environment, and it also meets the purpose of using raw materials in China.

Secondly, we can continually explore the raw materials in the soil solidification modifiers in different regions, as well as the soil modification techniques applied in road construction, and whether it can be gradually put into the modification technology of the earth wall. In the middle, we will achieve the interoperability between technology and technology to improve the practical effect of China's adobe wall modification technology.

Third, as far as possible, local resources are available. The land resources in different regions of China are different. For this reason, it is possible to select industrial and agricultural wastes and land resources to modify them and promote their modified materials. In line with the actual needs of the locality, it can not only reduce the cost of changing the surname, but also make the modified soil, in all respects, meet the actual needs of the building and achieve high quality improvement. The raw soil-based materials not only meet the actual needs of the construction industry, but also enable the new development of the soil-based materials modification industry in China, which has a very positive impact on the overall development.

5. Conclusion

In summary, the modification technology of raw soil-based materials still requires continuous analysis by relevant researchers in China to improve the effect of soil-based materials in actual use, and promote the application of more and more soil-based materials. In the construction of our country. It includes not only rural construction, but also the use of this material in urban construction, due to its environmentally friendly and superior thermal insulation, low energy consumption, and no pollution. Only by continuously analyzing this material can the construction industry always contribute to the social economy, and at the same time, it can achieve environmentally friendly development and make a positive impact on China's sustainable development.

Acknowledgement

In this paper, the research was sponsored by the Xi’an Eurasia University-level Scientific Research Fund Project, 2019XJZK01, Research on Basic Mechanical Properties and Modified Formulation of Raw Soil-Based Materials Incorporating Petroleum Industry Waste.

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