Research Progress and Experimental Discussion on Feldspathic Sandstone and Sand Mechanical Properties

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Abstract. This paper mainly introduces the mechanical properties of feldspathic sandstone and compound soil of feldspathic sandstone and sand, analyzed the research status at home and abroad as well as the future development direction. It also discusses how to carry out relevant research in the future, including test plan design, test piece preparation, and experimental principles, etc. All are introduced in depth.

1. Introduction

The feldspathic sandstone is a kind of mudstone and siltstone with incomplete development, whose main components are quartz, calcium montmorillonite and calcite [1]. It is mainly distributed in Inner Mongolia Ordos Plateau, Shanxi and Shaanxi, with a total area of approximately 11682km² [2]. Among them, the Zhungeer, Ejinholo, Dalateqi, Shaanxi Shenmu and Shanxi Hequ exposed to the most serious [3]. Sandstone and sand are the main causes of soil erosion and land desertification in the Maowusu sand land [4]. The aeolian sand structure is loose, has no cohesive force, high intergranular porosity, is difficult to form, and has poor shear resistance; sandstone sandstone texture Dense, rich in powder, poor degree of cementation between particles, low diagenesis, low structural strength, poor engineering performance, water loose loose, mud, vulnerable to weathering erosion [5-7].

2. Research progress

At present, the research on the sandstone is mainly focused on the lithology and erosion of the pluton sandstone, as well as the sandstone and sand compounded soils. Ye Hao and others discovered that the rock composition, structure and lithologic characteristics of the microstructures in the southern part of the area determined the weathering resistance and weathering degree of the different lithologic rocks, resulting in the difference of weathering erosion rates [8]. Fu Pei et al. [4] studied the characteristics of complex soils after mixing sandstone and sand with different mix ratios for the technical issues of how to mix sandstone and sand into soil. Wang Huanyuan et al. studied the physical properties of soils containing sandstone and sand mixed with different sediment contents, and studied the mechanism of
soil formation, and the technology of sandstone and sand compounded soils was applied in a large scale in the land remediation and development of agricultural cultivation in Mu Us Desert. Scientific basis [9]. Zhang Lu et al. studied the texture type, particle size distribution, and moisture parameters of the sandstone-sandstone compound soil under different mass ratios [10]. Li Xiaoli et al., through direct shear tests and unconfined compressive strength tests at different water cut rates for the undisturbed sandstone in Zhungeerqi, Erdos, Inner Mongolia, found that the shear strength of the sandstone is closely related to the slope of the sampling slope and the transformation of the water cut [11].

In recent years, different scholars have matured studies on the lithology and erosion [11, 12], mechanical properties of sandstone, and the physical and chemical properties of sand and sand, etc., laying a solid foundation for research on sandstone, but aiming at sandstone and sandstone. The study of the mechanical properties of sand "mixed soil" has not yet been studied. As we all know, there are strong erosion, loss, slope stability and engineering geology problems in the sandstone area. The particle size of the sandstone is relatively simple, and there are few sticky particles, cracks in the particles are interpenetrating, and rainwater can easily infiltrate these cracks. At the same time, due to the anisotropy of the sandstone, it is easy to cause collapse due to gravity. Collapse has made it difficult for many engineering activities to be carried out on it, such as road construction and housing construction. Therefore, it is necessary to study the mechanical properties of "mixed new materials" of sandstone and sand complex soils, and provide a new possible approach for solving the related environmental geological problems in the sandstone area.

3. Research directions and methods

3.1. Research directions
In this paper, based on the previous studies of the sandstones, the study focused on how to develop the specific mechanical properties of the sandstones and sands, mainly for different water content and sampling angles. The mechanical strength characteristics of soils include the following aspects of the test work: the basic physical performance indicators of the sandstone and sand compound soils used in the test were determined, and the indicators and related parameters of the test materials were obtained; the use of a fully automatic triaxial apparatus to measure the sandstone The mechanical strength indexes of sand mixed soils with different proportions, different moisture contents, and different compaction degrees were analyzed to obtain the stress-strain relationship, and the constitutive equations under unconfined compression conditions were established, and the damage types and influences were summarized. Regularity; The use of automatic consolidation instrument to determine the compressibility index of sandstone and sand complex soil under optimal mechanical strength conditions, and provide a theoretical basis for the project to estimate the building settlement and the degree of consolidation over different time.

3.2. Research methods
There are many factors affecting the mechanical strength of sandstone and sand complex soils, including the compound mass ratio, compaction degree, moisture content, particle size distribution, and experimental shear rate. This project mainly analyzes the effects of different mass ratios, different compaction degrees, and different moisture contents on the mechanical strength of the compounded soil. When the mass ratio and the compaction degree are quantitative, change the moisture content value; when the mass ratio and the moisture content are quantitative, change the value compaction degree; when the compaction degree and the moisture content are quantified, change the value to the mass ratio, determine the complex the mechanical properties of the soil. The mechanical properties studied include cohesion, internal friction angle, shear strength, and consolidation coefficient and bearing capacity of the foundation. Among them, is the normal pressure on the soil. According to the requirements of the configuration of different quality ratio and different moisture content of the compound soil, made of different degrees of compaction of the soil column, the use of automatic triaxial apparatus for consolidation and undrained shear, the same treatment requires three soil
columns for experimentation, in order to obtain the corresponding mechanical parameters of the soil column (three stress molar circles can be used to determine a set of data).

4. Conclusion
The research on the mechanical properties of sand-shale and sand complex soils has not been studied at home and abroad. However, the relevant researches on general soil mechanics properties are relatively rich and can be used for reference and reference; the instruments needed for the tests are now all available and involved. The measurement method is very mature. The study of the mechanical properties of the “mixed new materials” of sandstone and sand compounded soils provided a certain theoretical basis for land remediation and engineering construction in the Maowusu sand region, providing a new possible way for the solution of local related environmental geological problems.

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