THE GRAIN SIZE DISTRIBUTION OF SANDY SOILS IN LIBYA

MASSOUD FARAG ABOUKLAISH

Associate Professor, Faculty of Engineering and Technology Science, Sebha University, Libya

Abstract- Where that all types of soil consists of grains in different sizes, and these grains can be obtained and identified by knowing the results of grain size distribution of the soil tests. The results of grain composition of the soil are the basis for the classification and be very useful in obtaining some characteristics of the soil. So the main aim of the present study is to investigate and classify the particle size distribution of sandy soils in Libya. More than fifty soil samples collected from many regions, North, West and South of Libya. Laboratory sieve analysis tests performed on disturbed soil samples. As well as to provide an indicator of general engineering behaviour and good understanding, test results are presented and analysed, some of the significant parameters such as the gradation parameters and grain diameters for these types of soil have been identified, also found links between some of these parameters. Soil classification based on particle size analysis(USCS) is used. In addition, conclusions, recommendations are made.

Key words- Grain size distribution of soils, Sieve analysis tests, Soil classification.

I. INTRODUCTION

When measuring grain size distribution of soil grains larger than(0.075mm) sieving analysis is used. The grain size distribution of a soil is defined as the relationship between per cent passing (by mass) and the particle size. The particle size represents the size of particles that can pass a particular sieve mesh. The per cent passing represents the mass percentage of particles passing a particular sieve size. There are three primary types of grain size distributions[6]. These three types of distributions are known as well-graded soils, uniform soils, and gab graded soils. The grain size distribution for a soil provides several benefits, to classify soils, to estimate soil properties. Many researchers have studied the grain size distribution of the soil types and pointed to its importance[1), 4), 7)]. The range of particle sizes can be found out from the gradation curve. Soil gradation is a classification of a coarse-grained soil; soil gradation is an important aspect of soil mechanics because it is an indicator of many engineering properties of soils, such as compressibility, shear strength, permeability, etc. The good understanding of grain size distribution of the soils is important for the wide use of soil in many civil engineering works, several useful parameters and mathematical correlations can be determined from grain size distribution curves. Due to the presence of sandy soils in Libya[2),3)]. This study therefore focused on the determination of grain size distribution of the sandy soils of the mentioned regions in order to classify and to better understand their particle size distribution.

II. STUDIED AREAS AND SOIL SAMPLES

Areas where soil samples were taken included the north and west and the south of Libya as shown in table 1. From selected depths in soil layers at each site, sandy soil samples were taken from a depth of a bout 1m to 3m below the ground surface. The top soil layers at the studied areas consist of sandy layers extent to a depth of more than 5m below the ground level. The ground water table at all the sites is located below the studied soil layers.

Table1. Soil Samples Sites

North Regions- Libya	West Regions- Libya	South Regions- Libya
Tripoli, Janzur, AL Zahra, Al Saraj, Tajoura.	Zawia, Surman, Subratah, Al Ajellat.	Sebha, Brack, Murzuk, Tahalla, Takarkeyba, Algufra, Gat, Al abead.

III. EXPERIMENTAL RESULTS AND DISCUSSIONS

For the purpose of experimental investigations more than fifty samples of sandy soils were prepared in the laboratory. It was found out that all the soil samples were non-plastic. The grain size distribution analysis involving mechanical analysis was carried out. And the results of ten samples from each site are presented as shown in Figures (1), (2) and (3). The test results showed that all the soil samples do not have clay and the small percentage of silt as well as some of the very small percentage of gravel, and classified as poorly graded soils.

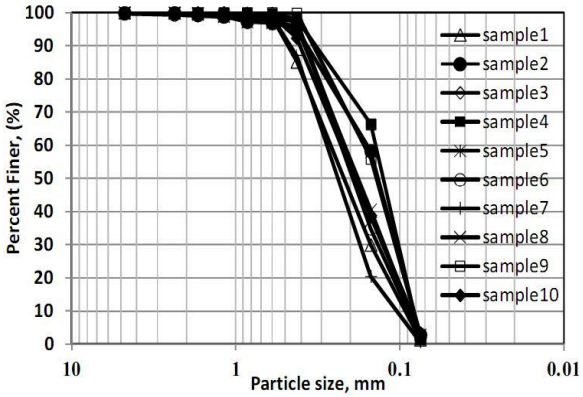


FIG.1. Particle Size Distribution Curves of the North Samples

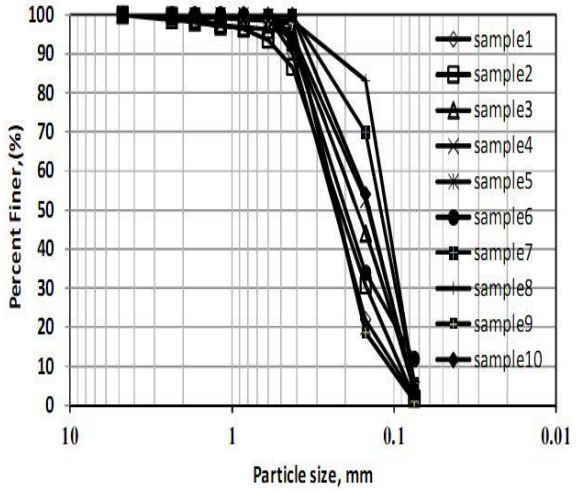


FIG.2. Particle Size Distribution Curves of the West Samples

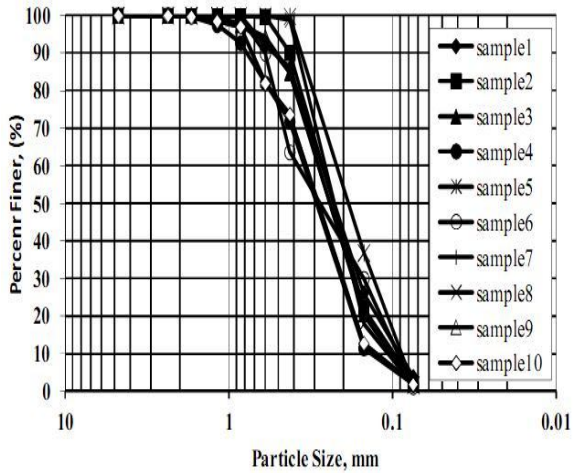


FIG.3. Particle Size Distribution Curves of the South Samples

The relations between the uniformity coefficient and the particle sizes, d50, d60 and d85 of the tested soils as have shown in Figures (4), (5) and (6). From these relations, one may observed a linear relation between uniformity coefficient and these particle sizes, the uniformity coefficient values ranging from 1.35 to 3.30 for all the tested soils from different regions.

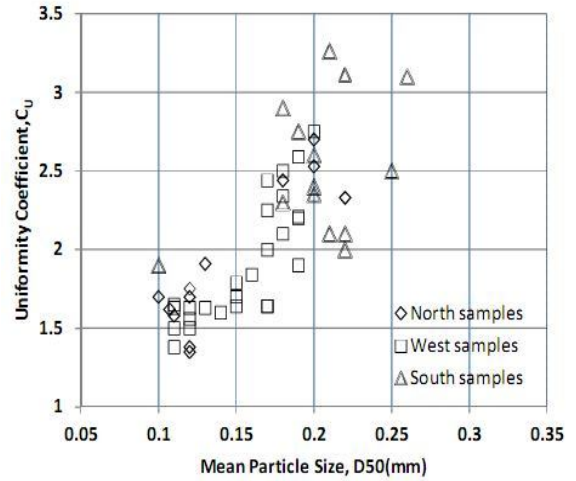


FIG.4. Relationship between Uniformity Coefficient and Mean Particle Size, D50

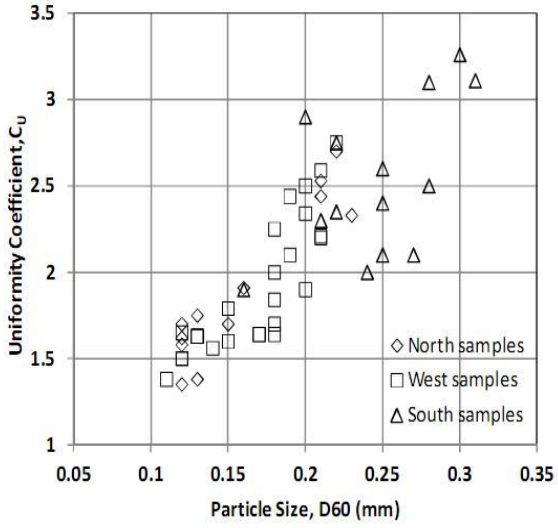


FIG.5. Relationship between Uniformity Coefficient and Particle size, D60

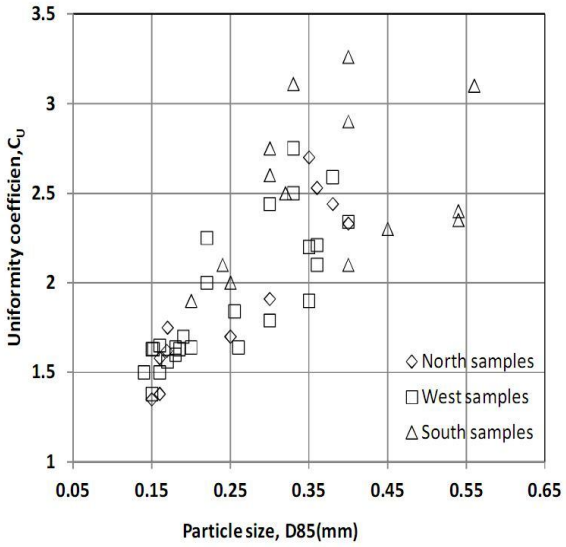


FIG.6. Relationship between Uniformity Coefficient and Particle size, D85

CONCLUSIONS

The following conclusions are drowned from the present research and can be summarized in the following main points:

1. The results of this investigation indicated that the grain size distribution of sandy soils from many regions in Libya is similar.
2. The test results and observations showed that all the tested sandy soils do not have clay and the small percentage of silt as well as some of the very small percentage of gravel.
3. The results of a series of grain size analysis and classification of sandy soils from many regions in Libya indicate poorly graded sandy soils.
4. Fine-grained sandy soils exist in many parts of Libya and at different depths below the ground surface.
5. Several useful parameters can be determined from grain size distribution curves.

6. The uniformity coefficient of the studied sandy soils increases with increasing the mean particle size (d50), particle size (d60) and particle size (d85).
7. The uniformity coefficient values of the studied sandy soils ranging between "1.35 to 3.30" which indicate poorly graded soils.
8. The particle size values of the tested sandy soils ranging as follows: d10 ranging from 0.06mm to 0.13mm, d50 ranging from 0.10mm to 0.26mm, d60 ranging from 0.10mm to 0.31mm and d85 ranging from 0.14 mm to 0.60mm.

RECOMMENDATIONS

I would recommend an increase research on these types of sandy soils to learn about the different engineering characteristics and find a guide to help identify them before they are used in various field of civil engineering.

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