Effect of grain size distribution on the maximum and minimum void ratios of granular soils

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Abstract

The maximum and minimum void ratios define the loosest and densest conditions of a granular soil. Correlations with some granulometric properties of soil are of interest for practical applications, but the experimental procedure to determine these variables can be time consuming. In this work the influence of the grain size distribution on the maximum and minimum void ratios is investigated. Twenty different granular soils with varying grain size distributions were prepared and tested. The experimental results, together with a compilation of 56 additional results reported in the literature, are statistically analysed. The analysis is conducted to examine the influence of some granulometric properties (D10, D30 and D60) on the maximum and minimum void ratios. As a result, some correlations considering the aforementioned variables are proposed. Subsequently, it is shown that the proposed correlations have better agreement with the experimental data than other proposals reported in the literature. The paper ends with some concluding remarks.

Keywords

grain size distribution, granular soils, relative density, maximum void ratio, minimum void ratio