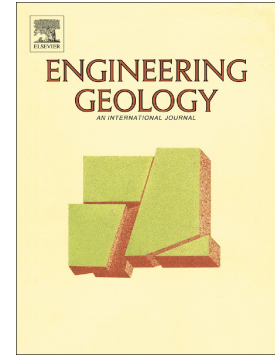


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A multi-variable equation for relationship between limiting void ratios of uniform sands and morphological characteristics of their particles

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Abstract

The limiting void ratios (i.e., the minimum and the maximum void ratios) are two important index properties, which are related to the compressibility, shear strength, and permeability of granular soils. Experimental studies have shown that the limiting void ratios are correlated to morphological properties of soil particles (i.e. particle size and particle shape). However, empirical equations available in literature for the limiting void ratios are generally single-variable functions of either particle size, or particle shape. In this study, we propose multi-variable equations, in which the limiting void ratios are functions of both particle size and particle shape. The coupled effects of particle size and particle shape on the limiting void ratios are illustrated. Advantages of the proposed multi-variable equations over the existing single-variable equations are shown by comparing the calculated void ratios with the experimental data on a large number of uniform sand samples. The proposed multi-variable equations can be applied to predict the limiting void ratios of uniform sands encountered in geotechnical engineering projects in order to properly support heavy loads.

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