

Some Considerations on Shearing Resistance

Angles of Sand

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Abstract

From both a theoretical and practical point of view, it is essential to make a standard of the choice of shearing strength parameters for the stability problem of cohesionless soil masses. In this paper, (1) based on the stress-dilatancy formulae and energy correction equation, the shearing resistance angles of ϕ_r and ϕ_{cv} are theoretically related to the intergranular friction angle of ϕ_μ , (2) a strength equation expressed in terms of anisotropy, remoulding, density and material property parameters is newly introduced, and (3) comparisons of experimental results with calculated ones by the proposed equations are presented.

1. Introduction

From both a theoretical and practical point of view, it is essential to appreciate the fundamental characteristics of shearing strength parameters and their proper use for stability analysis of cohesionless soil masses. Thus, in this paper,

- (1) shearing resistance angles and their proper use are described,
- (2) concept of shearing strength of granular material is briefly explained,
- (3) based on the stress ratio-strain increment ratio relationship (the so called stress-dilatancy relationship) and energy correction equation, the shearing resistance angle of ϕ_r and ϕ_{cv} are theoretically related to the intergranular friction angle of ϕ_μ , and comparisons of experimental results with calculated ones by the proposed equations are presented,
- (4) strength parameter λ is newly introduced and a strength equation expressed in terms of anisotropy, remoulding, density and intergranular friction is examined.

The data used in this paper were obtained using the conventional triaxial compression test. The shearing resistance of sand in a very loose state was not taken into consideration.

2. Choice of Shearing Resistance Angles

It is essential to have proper shearing resistance angles for stability analysis of sand and gravel. Shearing resistance of granular materials such as sand depends not only on the friction angle between sliding solids but also on the degree of shearing strain, density and particle characters. Therefore, engineers must choose the proper shearing resistance angle in the

Received November 12, 1982

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