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[a] Discussion period closed for this paper. Any other discussion received during this discussion period will be published in subsequent Journals.

8026 FLOW OF AIR THROUGH SOILS

KEY WORDS: aeration; field testing; mining; oxidation; permeability; pyrite; soil mechanics; wells

ABSTRACT: A proposed method for solution mining of low grade ore will involve the in situ aeration of large volumes of hydraulically deposited silty material. A laboratory investigation of the steady and unsteady flow of air through soil showed that Fick's law gives an adequate description of the flow process and, moreover, has mathematical advantages over the more common D'Arcy's law. The process of in situ air injection was examined theoretically on the basis of Fick's law. Experimental data from field tests were found to be in good qualitative agreement with the predictions of the theory.

REFERENCE: Blight, Geoffrey E., "Flow of Air Through Soils," Journal of the Soil Mechanics and Foundations Division, ASCE, Vol. 97, No. SM4, Proc. Paper 8026, April, 1971, pp. 607-624.

8062 SHEAR STRENGTH OF SAND AT VERY LOW PRESSURES

KEY WORDS: apparent cohesion; confinement; dilatancy; friction coefficient; low pressures; models; pressure distribution; quartz; sand; shear strength; soil mechanics; triaxial tests

ABSTRACT: Data contributing to the understanding of the nature of shear strength at extremely low pressures are presented. The expanding use of models for solving soil stability problems has aroused considerable interest in the behavior of sand at confining pressures below 5 psi. Triaxial compression tests were carried out varying the cell pressure between 0.20 psi and 35 psi. Experimental evidence shows that the increased dilatancy of sands sheared at extremely low pressures produces an increase in the principal stress ratio at failure. The overall increase in strength is mostly represented by the introduction of an apparent cohesion intercept. Values of this intercept for the quartz sand tested range from 0.14 psi at loose states to 0.22 psi at dense states. Values of the angle of shearing resistance at extremely low pressures are smaller than those obtained at moderate pressures by less than 0.5°. For loose states, shear can be associated with expansive volume change if the normal pressures are low enough. The shearing behavior of loose sands at very low pressure is quite similar to that of dense sands at moderate pressure.

REFERENCE: Ponce, V. Miquel, and Bell, James M., "Shear Strength of Sand at Extremely Low Pressures," Journal of the Soil Mechanics and Foundations Division, ASCE, Vol. 97, No. SM4, Proc. Paper 8062, April, 1971, pp. 625-638.

8039 LIQUEFACTION IN TRIAXIAL AND SIMPLE SHEAR TESTS

KEY WORDS: cyclic loading; liquefaction; overburden; sands; shear; shear tests; soil mechanics; test procedures; triaxial tests; void ratio

ABSTRACT: Data from cyclic loading simple shear and triaxial tests indicate that the important variable controlling the incidence of liquefaction in a given number of cycles in a saturated sand at a particular void ratio is the initial effective stress ratio; the ratio of the peak alternating shear stress to the initial effective mean normal stress. Contrary to previously published results, equal resistances to liquefaction are obtained in both kinds of tests. This agreement is considered to be due to three things: (1) Representation of the confining pressure in the simple shear test by the mean normal stress in the plane of deformation; (2) the improved model of the simple shear apparatus used; and (3) the use of experimental techniques which insure the development of uniform strains in the simple shear test. The experimental techniques used evolved from a fundamental study of the deformation of samples in the simple shear apparatus.

REFERENCE: Finn, W. D. Liam, Pickering, Dennison J., and Bransby, Peter L., "Sand Liquefaction in Triaxial and Simple Shear Tests," Journal of the Soil Mechanics and Foundations Division, ASCE, Vol. 97, No. SM4, Proc. Paper 8039, April, 1971, pp. 639-659.