ASCE METROPOLITAN SECTION
Geo-Institute Chapter

PRESENTS:
7th GZA Lecture

TOPIC:
Factors Affecting the Shear Strength of Granular Materials

SPEAKER:
Poul V. Lade, PhD
Professor of Geotechnical Engineering at George Mason University

AT:
CUNY Graduate Center
Recital Hall, New York City
365 Fifth Avenue
(NE corner of
5th Ave and 34th Street)

WHEN:
Thursday, February 16, 2017
Refreshments: 5:30 p.m.
Lecture: 6:00 p.m.

One Professional Development Hour (PDH) is applied for
$15 fee for non-members

For more information, contact
Frank DiSalvo at 914-423-1331
or
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LECTURE SUMMARY

The lecture aims to explain which factors influence the strength of soils, and the goal is to develop a better failure criterion. Of course, just being aware of the factors that are important and where they are important is a goal in itself. Triaxial compression tests, true triaxial tests and torsion shear tests indicate that the shape of the 3D failure surface for geo-materials such as soils is influenced by the minor and the intermediate principal stresses, the void ratio, shear banding, curvature in meridian planes, principal stress direction in cross-anisotropic soils, and overconsolidation. An expression for the isotropic 3D failure surface has been developed. However, the occurrence of shear banding is a discrete event that cannot be included in the failure criterion, but requires individual calculations based on criteria that may be set out and included in finite element or finite difference programs. Some details regarding conditions for shear banding will be explained, and it can be shown that they work well by comparison with experimental results. Shear banding occurs in the hardening regime of the stress-strain behavior in the midrange of b-values from about 0.18 to approximately 0.85. In this range both experiments and analysis show that the friction angles are lower than those implied by the isotropic failure criterion. Thus, the 3D failure surface is not continuous and cannot be described by a single expression, but may be obtained by combining the continuous failure surface with results of predictions of shear banding. Experiments performed in all three sectors of the octahedral plane indicate that pluviated sand exhibits cross-anisotropy with lower strength in the horizontal directions than in the vertical direction. Experiments performed in torsion shear with various inclinations of the major principal stress relative to the bedding planes showed a smooth transition in strength from vertical to horizontal, but with a trough near the orientation where shear bands are parallel to the bedding planes. The lecture will concentrate on what is found from experiments.

The Speaker:

Professor Poul Lade received his MS degree from the Technical University of Denmark in 1967 and his PhD in 1972 from the University of California at Berkeley. His academic career began at the University of California at Los Angeles (UCLA, 1972-1993) and he continued at Johns Hopkins University (1993–1999), Aalborg University in Denmark (1999–2003), the Catholic University of America (2003–2015), and George Mason University in Washington, DC. His research interests include application of appropriate experimental methods to determine the three-dimensional stress–strain and strength behavior of soils and the development of constitutive models for frictional materials such as soils, concrete, and rock. He has written nearly 300 publications based on research performed with support from the National Science Foundation (NSF) and from the Air Force Office of Scientific Research (AFOSR). He was elected member of the Danish Academy of Technical Sciences (2001), and he was awarded Professor Ostenfeld's Gold Medal from the Technical University of Denmark (2001). He was inaugural editor of Geomechanics and Engineering and he has served on the editorial boards of eight international journals on geotechnical engineering. Wiley published his book on Triaxial Testing of Soils in May 2016.

Upcoming Geo-Institute Chapter Events:

- Thursday, 3/16/17- 3rd Annual RA Consultants Lecture
- Thursday, 4/13/17 – 15th Annual William Barclay Parsons Lecture