



The Hong Kong University of Science and Technology

Scientific Computation Concentration



Geotechnical Stability Analysis

by

Prof Scott SLOAN

University of Newcastle

Abstract

Historically, geotechnical stability analysis has been performed by a variety of approximate methods that are based on the notion of limit equilibrium. Although they appeal to engineering intuition, these techniques have a number of major disadvantages, not the least of which is the need to presuppose an appropriate failure mechanism in advance. This feature can lead to inaccurate predictions of the true failure load, especially for cases involving layered materials, complex loading, or three-dimensional deformation.

In this lecture, the speaker will describe recent advances in stability analysis, which avoid these shortcomings. Attention will be focused on new methods, which combine the limit theorems of classical plasticity with finite elements to give rigorous upper and lower bounds on the failure load. These methods, known as finite element limit analysis, do not require assumptions to be made about the mode of failure, and use only simple strength parameters that are familiar to geotechnical engineers. The bounding properties of the solutions are invaluable in practice, and enable accurate solutions to be obtained through the use of an exact error estimate and automatic adaptive meshing procedures. The methods are extremely general and can deal with layered soil profiles, anisotropic strength characteristics, fissured soils, discontinuities, complicated boundary conditions, and complex loading in both two and three dimensions. Following a brief outline of the new techniques, stability solutions for a number of practical problems will be given including foundations, anchors, slopes, excavations, and tunnels.

Date: Friday, 27 October 2017

Time: 6:00p.m.-8:00p.m.

***Venue: LT H, Academic Building
(near lifts 25 & 26), HKUST***

All are welcome!