LECTURE SERIES SEMINARS AND WORKSHOPS ON GEOTECHNICAL ENGINEERING PRACTICE

Organised by: Centre for Infrastructure Engineering and Management and School of Engineering, Griffith University Gold Coast campus

Date: 10 – 14 July 2006

Venue: Building G23 (Multimedia Building) Room 2.07
Griffith University Gold Coast Campus

Content of Flyer:

See "Registration form" for daily registration.

For additional information please contact (preferably by e-mail)

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Introduction

In the second week of July, a Short course-cum-Seminar-cum Lecture Series is being arranged under the title, Geotechnical Engineering Practice and Use of Computer Software. In the last two decades there has been a major shift in the Civil Engineering and Mining Industries in using computer software for analysis and design of both major projects and relatively moderate size projects, as opposed to the classical design procedures. A number of software packages including Plaxis, Flac, Abacus, Wallap, UDEC, SLOPE, SEEP, DEFPIG, PIGLET, COFEA, APRAF, FEAR6, GARP7, 3DEC , COSFLOW which are in wide use in the industry and academic circles, will be discussed.

In this Workshop and Lecture series, experts with long-standing experience in the use of such software packages, both from industry and academia, will give authoritative lectures. Also, Plaxis experts will run a Short course. Plaxis is now very widely used internationally and it has been under constant development for nearly thirty years. Plaxis also has a large number of authoritative people internationally selected and the course has been run in a large number of countries, including Australia. Already a large number of leading companies and academics have indicated their strong support in delivering lectures and in participating in the event. Selection of geotechnical parameters and the role of laboratory and field tests will also form an important aspect of the Short Course and Lectures.

The experts who will lecture in the July 10-14 event include: Prof. Harry G. Poulos, Dr. Jim Shiau, Dr Habib Alehossein , Dr. Harry Asche, Prof. Paulus P. Rahardjo, Prof. Robert Lo, Dr. Jeff Hsi, Dr. Ardie Purwodihardjo, Dr. Honghua Zhang, Dr. Mike Coulthard, Dr. Loganathan, Mr. Willy Lemanza and Dr. Dominic Ong.

This bulletin contains the registration form, the titles and abstracts of the lectures and the bio-data of the lecturers.

Registration Form

(GEOTECHNICAL ENGINEERING PRACTICE AND USE OF COMPUTER SOFTWARES)

Given Name:			
Last Name:			
Position:		Title:	
Organisation:			
Department:			
Address:			
State:		Postcode:	
Telephone:		Facsimile:	
Mobile:			
Email:			
Please inform us of any special dietary requirements. *The registration fee includes light refreshment, light lunch and handouts during the program.*			

Enclosed is my registration fee of: _____

□ **AUD$330** (*GST included*) – for 10 July.
□ **AUD$330** (*GST included*) – for 11 July.
□ **AUD$330** (*GST included*) – for 12 July.
□ **AUD$330** (*GST included*) – for 13 July.
□ **AUD$330** (*GST included*) – for 14 July.

Cheque Payments:

Cheques or money order to be made payable in Australian Dollars to "**Griffith University**". In Australia, the ABN, required to be used for GST purposes, is **78106094461**.

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Card Number: _____
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Name of Card holder: _____
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Amount to be charged: _____

Please fax or mail the completed form (by 1 July 2006) to

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Fax: +61 7 55528065

10th July 2006 (Monday)

08:30 – 09:00 am Registration

09:00 – 10:00 am Pile Group Settlement Estimation

Prof. Harry G. Poulos

This lecture reviews the evolution of settlement analysis for pile groups, and the transition from research to practice over the past 30 to 40 years. The gradual incorporation of important aspects of reality is reviewed and it is shown that recent research has enabled complex practical problems to now be examined in a systematic, albeit approximate, manner. The significance of various parameters is reviewed and suggestions are given regarding appropriate methods of preliminary and detailed analysis, and of methods whereby the key geotechnical parameters may be assessed. The pitfalls of inappropriate application of theoretical research to practice are illustrated by examples.

10:00 – 11:00 am Pile Group Settlement Computer Programs—Capabilities and Short-comings—Prof. Harry G. Poulos

This lecture will discuss a number of commercially-available computer programs that can be used for the analysis of pile group settlement and lateral response. The limitations and capabilities of each program are outlined, and the required geotechnical input parameters are summarized. Comparisons between the results of some of the programs will be shown.

11:00 – 11:15 am Coffee break

11:15 – 12:15 pm 'Stability and deformation analysis using Flac Software and its role in Geotechnical Engineering Practice"

Dr. Jim Shiau

Deep Braced Excavation—Part 1

Deep braced excavation: deformation analysis under working load condition; soil-structure interaction considering existing

nearby buildings; prediction of wall deformation and ground settlement; calculation of wall bending and shear for structural design.

12:15 – 01:00 pm Lunch

01:00 – 02:15 pm **Basic concepts and theories of tunnelling and excavation engineering and ground supports-Part 1**
Dr Habib Alehossein

Tunnelling and excavation engineering is about accurate and safe handling of excavation forces, which depend on gravity forces, rock mass behaviour, water and gas interactions and ground stress history. Geotechnical engineers are aware of the continual changes in the state of stress, strain and deformation around their excavation site. They are the responsible people with the best knowledge, information and expertise on the ground stress, strain and deformation distribution history. They calculate the current stresses in a rock mass from analytical or numerical simulations of invisible events such as previous floods, water fluctuations, erosions, back-fills, excavations, and the current stress-changing operations. They use instrumentation or monitoring equipment to obtain continuous records of rock mass behaviour and use these data to calibrate their stress analysis model of the rock mass. The first part of the lecture covers the basic theories of excavation engineering and tunnelling and the required stress analysis. In particular, analysis of simple tunnels are discussed and effects of tunnel shape, in-situ stress and nearby voids and structures are discussed.

02:15 – 03:30 pm **Basic concepts and theories of tunnelling and excavation engineering and ground supports—Part 2**
Dr Habib Alehossein

Rock mass strength is limited and often cannot sustain new redistributed ground forces developed by an unsupported excavation, which eventually results in complete failure of the rock mass. An important aspect in excavation engineering and tunnelling is the accurate, timely and safe implementation of the appropriately designed support structures to protect man-made voids from failure. In this lecture, tensile, shear, compressive

and bending strength of the rock is discussed together with common rock failure criteria. Applications of rock strength theory to rock bursting and tunnel failure are reviewed. Mechanisms of rock supporting and various types of supports, including rock bolting and cable reinforcements, are discussed. Several simple example problems are used to demonstrate the applications of the concepts and theories discussed during the lecture.

03:30 – 03:45 pm Coffee break

03:45 – 05:15 pm **Stability and deformation analysis using Flac Software and its role in Geotechnical Engineering Practice"**
Dr. Jim Shiau
Soft Ground Tunnelling- Part 2

Soft ground tunneling: deformation and collapse analyses of plane strain circular tunnels; modeling of tail gap closure; single and twin tunnels; interaction analysis of tunnel construction and existing nearby buildings.

11th July 2006 (Tuesday)

08:30 – 09:00 am Registration

09:00 – 10:30 am Tunnelling practices in Queensland.
Speaker: Dr. Harry Asche (Connell Wagner)

!0.30 - 11 am Introduction to Plaxis Course
Prof. Paulus P. Rahardjo

11:00 – 11:15 am Coffee break

11:15 – 12:15 pm Finite element analysis and Plaxis
Prof. Paulus P. Rahardjo

12:15 – 01:00 pm Lunch

01:00 – 02:00 pm Geotechnical Models and Selection of Geotechnical

Parameters
Prof. Paulus P. Rahardjo

02:00 – 03:30 pm **Numerical Modelling in Geotechnical Engineering**
Prof. Robert Lo

03:00 – 03:15 pm **Coffee break**

03:15 – 05:15 pm **Coupled Finite Element Analysis**

of Ground Movement and Groundwater Flow

Speaker: Dr. Jeff Hsi (SMEC)

Such problems are often encountered by practicing engineers in situations such as consolidation of soft soils as a result of pore water pressure dissipation and land subsidence due to drawdown of the water table caused by excavation in saturated soils or pumping of groundwater.

A finite element program COFEA (Coupled Finite Element Analysis) using 8-noded isoparametric elements will be described. The program incorporates elastic and elasto-plastic soil models, such as modified Cam-clay model and hyperbolic soil model, for broad applications.

The program COFEA has been successfully applied to a range of geotechnical projects, including: excavation of saturated soft soils for construction of a building basement; strengthening of an earth dam involving seepage through the dam; pumping of groundwater for construction of an underground train station; tunnelling in saturated soil involving groundwater inflow into the tunnel; dredging of soil in front of a sheet pile wall at a wharf, and consolidation of soft clays with surcharge and wick drains.

12 th July 2006 (Wednesday)

Plaxis Hand on Training

08:30 – 09:00 am **Registration**

09:00 – 10:30 am **Plaxis Exercise1 – Strip Foundations**
Prof. Paulus P. Rahardjo

10:30 – 10:45 am Coffee break

10:45 – 12:15 pm Plaxis Exercise 2- Reinforced embankments
Prof. Paulus P. Rahardjo

12:15 – 01:30 pm Lunch

01:30 – 03:00 pm Plaxis Exercise 3—Deep Excavations
Prof. Paulus P. Rahardjo

03:00 – 03:15 pm Coffee break

03:15 – 04:45 pm Plaxis Exercise 4—Deep Foundations
Prof. Paulus P. Rahardjo

13th July 2006 (Thursday)

08:30 – 09:00 am Registration

09:00 – 10:00 am Analysis of soil- structure interaction and their application in design and construction controls of tunnels in soils, soft rocks and hard rocks including case histories in France, Germany, Hong Kong etc (Part 1)
Dr. Ardie Purwodihardjo (Golder Associates)

Numerical analysis by means of the finite difference method has been developed with the aim of developing a procedure for forecasting movements and stresses induced by tunnelling. Three types of numerical calculations are discussed; three dimensional analysis, axi-symmetric analysis and plane strain analysis. The limitations of each analysis method are discussed, and a new method is introduced which can take into account the three dimensional effects in tunnelling. The lecture and case histories are presented in three parts.

10:00 - 11:00 am Analysis of soil- structure interaction and their application in design and construction controls of tunnels in soils, soft rocks and hard rocks including case histories in France, Germany, Hong Kong etc (Part 2)
Dr. Ardie Purwodihardjo

11:00 – 11:15 am Coffee break

11:15 – 12:15 pm The role of constitutive models in the prediction of deformations induced by underground constructions

Dr. Ardie Purwodihardjo

This lecture provides an overview of constitutive modelling for geomaterials and its application in numerical analysis of tunnelling.

12:15 – 01:00 pm Lunch

01:00 - 02:00 pm Selection of Geotechnical parameters in the analysis of tunnels with computer softwares.

Doug Maconochie

02:00 – 03:00 pm Stability and deformation analysis using Flac Software and its role in Geotechnical Engineering Practice"—Part 3

Dr. Jim Shiau

--Cantilever sheet pile wall: a comparison of bending moment and shear force between numerical analysis and traditional limit equilibrium method.

--Classical earth pressure problems: rigorous numerical models for the calculations of active and passive earth pressures considering soil-structure interaction with interface modeling.

03:00 – 03:15 pm Coffee break

03:15 - 05.00 pm

FE modeling of a deep excavation is made using 2-D SAGE-CRISP version 5.1 and PLAXIS version 8.2. The capability of SAGE-CRISP in performing a fully coupled-consolidation analysis using Biot's (1941) formulation is also presented. The results obtained from 2-D modeling using PLAXIS and 3-D centrifuge studies for cases of an existing single pile and a group of piles located nearby to an excavation will also be discussed as 3-D modelling is relatively more complicated and very time-consuming for rigorous use in practice.

Further, Plaxis and SLOPE/W studies on two embankment dams founded on soft seabed and the modelling of ground improvement technique using offshore stone columns in enhancing the stability of the dams will also be included. Finally, use of SLOPE/W coupled with SEEP/W in analyzing a 35-m high water-supply dam and a 12-m high hydraulically placed sand-fill embankment will also be presented.

14th July 2006 (Friday)

08:30 – 09:00 am Registration

09:00 – 10:30 am Analysis of piled raft subjected to general loading

Dr. Honghua Zhang

In the analysis, the piled raft was separated into three parts: the raft, the piles and the soil. The finite element method based on thin plate theory was used to analyse the raft; the finite layer theory was then used for the analysis of the soil, while the piles were solved by using the simple beam theory. A program APPRAF (Analysis of Piles and Piled Raft Foundations) (now called APRAF) was developed which may theoretically cover the analysis of single piles, pile groups, unpiled rafts and piled rafts on or off the ground. The comparisons of the present solutions with existing solutions, those calculated by well-known program FEAR6, GARP7 or FLAC3D, and published lab or full-scale test results show that the present method is a powerful and useful way to evaluate the elastic behaviour of the pile, raft and piled raft foundations embedded in or resting on different types of soils and subjected to general loading.

10:00 – 11:00 am Applications of nonlinear stress analysis programs *FLAC*, *UDEC*, *FLAC^{3D}* and *3DEC* in projects in tunnelling and in open pit and underground mining works.
Dr. Mike Coulthard (Part 1)

11:00 – 11:15 am Coffee break

11:15 – 12:15 pm Non-linear analysis and design of tunnels and mines
Mike Coulthard (Part 2)

12:15 – 01:00 pm Lunch

1.00 pm - 2.00 pm Non-linear analysis and design of tunnels and mines
Mike Coulthard (Part 3)

02:00 - 0315 pm CSIRO COSFLOW software program for:
-- ground subsidence control, stress, deformation, gas and water pressure;
-- flow analysis and interactions in jointed and laminated rock strata.
Dr Habib Alehossein