Two-Day Short Course on
Block Theory & Applications for Surficial and Underground Rock Excavations
will be taught by
Professor P.H.S.W. Kulatilake
Director, Rock Mass Modeling and
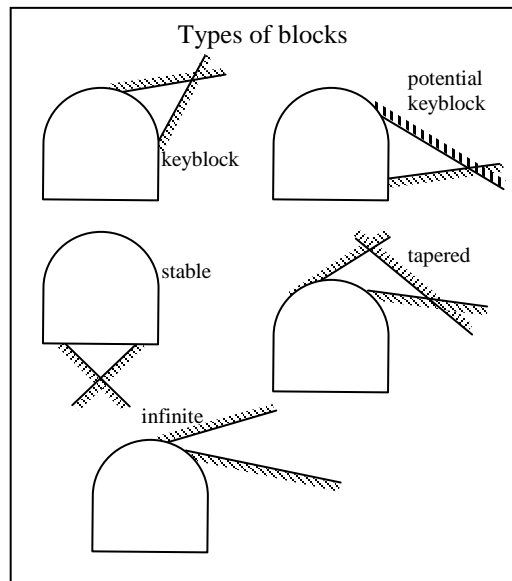Computational Rock Mechanics Laboratories
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Tucson, Arizona, USA
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Fax: 520-577-6515
E-mail: kulatila@u.arizona.edu

Types of blocks

potential keyblock

keyblock

stable

tapered

infinite

December 10-11, 2014
Course will be taught in
a hotel in Colombo, Sri Lanka
Information pertaining to this will be provided in early November 2014 by the Short Course Co-ordinator Ms. Woshari Mahawattage (woshari@gmail.com)

OBJECTIVES

The objective of the short course is to show the applications of block theory for rock mass surficial and underground excavations. The course lecture notes that is equivalent to about 250 pages will be distributed at the start of the course. Application of the theory will be illustrated using discontinuity data from a few hydro power project sites in China and a few mine sites in USA.

COURSE CONTENT

Part 1: Introduction to Rock Fracture Sets & Rock Block Instability; Stereographic Projection and Discontinuity Shear Strength (1/2 day)
A power point presentation on rock fracture sets and rock block instability; Fracture geometry mapping & basic characterization; Principles of stereographic projection; Shear strength of rock discontinuities.

Part 2: Block Theory & Applications for Surficial Excavations (3/4day)
Stereographic projections for block theory; Stereographic projection of a joint pyramid; Projection of sliding direction; Types of blocks; Theorem for finiteness; Theorem on the removability of a finite, convex block; Symmetry of block types; Jointed blocks in 2D and 3D; Stereographic solution for jointed blocks; Conditions for removability of blocks intersecting surface excavations; Identification of key blocks in surficial excavations using stereographic projection; Procedures for designing rock slopes; Modes of sliding; Sliding force; Kinematic conditions for lifting and sliding; Stereographic projection for the joint pyramid corresponding to a given sliding direction; Comparison of removability and mode analyses; Application of deterministic and probabilistic block theory

analyses for surficial excavations using discontinuity data from a few hydro power project sites in China and a few mine sites in USA to find maximum safe slope angles.

Part 3: Block Theory & Applications for Underground Chambers (1/4 day)
Key blocks in the roof, floor and walls; Blocks that are removable at edges; Blocks that are removable at corners; Applications for an underground chamber; Choice of direction for an underground chamber; Intersections of underground chambers; Pillars between underground chambers; Examples.

Part 4: Block Theory & Applications for Tunnels & Shafts (1/2 day)
Geometric properties of tunnels; Blocks with curved surfaces; tunnel axis theorem; types of blocks in tunnels; The maximum key block; Computation of the maximum key block using stereographic projection methods; Removable blocks of the portals of tunnels; Examples.

Who Should Attend:
Civil, Mining and Geo-engineers and geologists who are involved in surface and underground excavations analysis, design and construction activities associated with jointed rock masses will benefit from the short-course.

Time Schedule (each day):

8:00—10:00	Lectures
10:00—10:30	Coffee break
10:30—12:30	Lectures
12:30-- 13:30	Lunch
13:30-- 15:30	Lectures
15:30-- 16:00	Coffee break
16:00-- 18:00	Lectures

Narrative Biography of Prof. Kulatilake:

Dr. Pinnaduwa H.S.W. Kulatilake is a Professor of Geotechnical Engineering and Director of Rock Mass Modeling and Computational Rock Mechanics Laboratories at the University of Arizona. He is a registered Professional Civil Engineer in California. He received his B.Sc. (in 1976) in Civil Engineering from the University of Sri Lanka, Peradeniya, MS (in 1978) in Soil Engineering from the Asian Institute of Technology, Bangkok, Thailand and Ph.D. (in 1981) in Civil Engineering (with geotechnics emphasis) from the Ohio State University, USA. He has over 34 years of experience in rock mechanics & rock engineering associated with mining, civil and petroleum engineering, geotechnical engineering, and applications of probabilistic and numerical methods to geo-engineering. He has written over 200 papers and is a member of several technical committees. He has delivered 25 keynote lectures and over 40 other invited lectures throughout the world on topics related to rock fracture network modeling, probabilistic geotechnics, mechanical and hydraulic properties of joints, rock slope stability and mechanical and hydraulic behavior of rock masses. He has been a research paper reviewer for 20 technical Journals and an editorial board member for Int. Jour. of Rock Mechanics & Mining Sciences, Int. Jour. of Geotechnical and Geological Engineering, Int. Jour. of Advances in Geological and Geophysical Engineering, Coal Science and Technology and Journal of Mining & Science-Turkey. He has taught short courses on stochastic fracture network modeling, rock slope stability analysis, Block theory, and rock joint roughness and aperture in Sweden, Mexico, Austria, USA, Canada, Hong Kong, Poland, Finland, Australia, South Korea, Sri Lanka, Egypt, Iran, Chile, China, Italy and Peru. He has served over 20 years either as the primary or the sole examiner for the geological engineering professional exam conducted by the Arizona State Board of Technical Registration. He was a Visiting Professor at the Royal Institute of Technology and Lulea University of Technology in Sweden as part of his sabbatical leave. Also, he was a Visiting Research Fellow at the Norwegian Geotechnical Institute, for another part of his sabbatical leave. Due to the contributions he made on teaching, research, consulting and service activities, he was elected to the Fellow Rank of the American Society of Civil Engineers at the relatively young age of 45. In 2002, he received Distinguished Alumnus Award from the College of Engineering, Ohio State University and Outstanding Asian American Faculty Award from the University of Arizona in recognition of his achievements and contributions made to the advancement of his profession. In December 2005, Eurasian National University, Kazakhstan conferred him "Honorary Professorship". In August 2007, he organized and ran a successful International Conference on Soil & Rock Engineering in Sri Lanka. In January 2009, he organized and ran a high quality International Conference on Rock Joints and Jointed Rock Masses in Tucson, Arizona. He was the guest editor for two special issues published in the Jour. of Geotechnical and Geological Engineering. He received "Kwang-Hua Visiting Professorship" for 2009-2010 from the College of Engineering, Tongji University, China. He is a Recipient of "Guest Professorship" from Wuhan University, China for 2010-2013. Recently he received an award in the amount of 515,000 RMB (US$ 81,320) from the Chinese Academy of Sciences to spend a sabbatical in China as a Senior Visiting Professor. Currently he has research funding in the amount of US$ 1.5 million to conduct research in the rock mechanics and rock engineering field.

Registration Conditions:
The course fee must be paid in full by the registration deadline of November 3, 2014. The course fee includes course notes, lunch and refreshments for morning and afternoon tea/coffee breaks. The number of applicants for each course is limited and acceptance will be on a first come, first served basis. If the course is cancelled, then the full short course fee will be refunded. **No refund will be given after November 10, 2014. Non-arrivals at the course will be liable to pay the full course fee and no refund will be given. However, substitutions will be allowed.**

Registration Form
Short Course on Block Theory & Applications for Rock Excavations
Colombo, Sri Lanka, December 2014

Name: _____

Title: _____

Organization: _____

Mailing Address: _____

_____

Telephone Number: _____

Fax Number: _____

E-mail address: _____

Registration Fee: See below

I have read and agree to the conditions of entry as stipulated in this brochure.

Signature : _____ Date: _____

Registration Fee:
Foreign delegates and private company delegates in Sri Lanka: US$ 600 (SR 78000)
Government and University Faculty and Researchers in Sri Lanka: SR 37500
Students in Sri Lanka: SR 25000

Course Co-ordinator for course registration, accommodation reservation and other practical matters:
Ms. Woshari Mahawattage
Tel:+94 77 3412703
E-mail: woshari@gmail.com

Methods of Payment:

Sri Lankan delegates:
Option 1: Cash payments to
Ms. Woshari Mahawattage
Tel: 0773412703
E-mail: woshari@gmail.com

Option 2: Bank Pay Order (Cashier's check): The information on how to write the check will be provided by Ms. Woshari Mahawattage later upon receiving the completed Registration form.

Foreign delegates:
Option 1: Make a Cashier's check or money order payable in US funds, through a US bank to:
P.H.S.W. KULATILAKE and mail it to:
  Prof. P.H.S.W. Kulatilake
  Dept. of Materials Science & Engineering
  Mines Bldg. # 12, Rm 131
  1235 E. James E. Rogers Way
  University of Arizona
  Tucson, AZ 85721, USA

Option 2: Wire transfer: Name of the bank, routing number & the account number will be provided later upon receiving the completed Registration form.

EXPLANATIONS
discontinuity normal vectors from set 1
discontinuity normal vectors from set 2
discontinuity normal vectors from set 3
the number of · : 289
the number of · : 144
the number of · : 371

Cell A, Cell B, Cell C