Announcing

# *AEG San Francisco Section Meeting*

# Student Night

**The Stress-dependent Permeability of Granular Material**
**by Sang-min Kim, University of California, Berkeley**

**3-D Characterization and Analysis of Fold-Fracture Relationships Using Airborne Laser Swath Mapping (ALSM) and Differential Geometry with Application to Raplee Monocline, Utah**
**by Ian Mynatt, Stanford University**

**Investigation of the Silver Fire Landslide, South Fork American River Canyon, El Dorado, California**
**by Corinne S. Stewart, San Jose State University**

**Restaurant:** Sinbad's, Pier 2 Embarcadero Street, San Francisco
(Phone 415.781.2555 for directions only—not a reservation line)

**Date and Time:** Tuesday, March 14, 2006

6:00 pm—Social Hour and Sign-in
7:00 pm—Dinner (Fish, Beef or Vegetarian)
8:00 pm—Presentation

**Cost:** $35 AEG Members, $40 Non-members, $15 Students

**Reservations:** AEG members fax or e-mail Sachiko Tanikawa (fax # 510.268.5099, treasurer@aegsf.org) with the following information

(1) Name
(2) Phone number
(3) Meal choice

**Please Note:** Reservation deadline is NOON on FRIDAY, March 10; availability cannot be guaranteed after this deadline. **Walk-ins are not guaranteed!** For financial reasons no-shows and last minute cancellations will be charged.

*See over for abstracts and speaker biographies.*

## The Stress-dependent Permeability of Granular Material

by Sang-min Kim, GeoEngineering, University of California, Berkeley

A rationale model which describes stress-dependency of the permeability of granular material under hydrostatic compression has been developed. Stress and permeability are coupled using the compression model and the Kozeny-Carman relation. Permeability is strongly influenced by the specific surface area, and changes in specific surface area are mainly induced by the crushing of particles. To take the effect of particle crushing into account, a linear particle crushing model is proposed for material without cementation. A three-parameter hyperbolic-linear particle crushing model is developed for the material with cementation as a significant difference in permeability behavior is noticeable when there is cementation in the material. The rationale model is capable of modeling the permeability behavior under hydrostatic compression over the wide range of applied pressure. The model has been evaluated against the test data performed by several researchers, and provides excellent predictions of measured permeability behavior under hydrostatic compression.

## Speaker Biography

Sang-min Kim is a Ph.D. candidate in GeoEngineering at the University of California, Berkeley. He is currently working with Prof. Sitar and Prof. Pestana in various topics in constitutive modeling of soils and rocks. Education: Master of Science in Geophysics, Stanford University, August 2004, Master of Science in Geotechnical Engineering, University of California, Berkeley, May 2002, Bachelor of Science in Civil, Urban and Geosystem Engineering, Seoul National University, Korea, February 2001

## 3-D Characterization and Analysis of Fold-Fracture Relationships Using Airborne Laser Swath Mapping (ALSM) and Differential Geometry with Application to Raplee Monocline, Utah

by Ian Mynatt Department of Geological and Environmental Sciences, Stanford University, Stanford, CA 94305-2115, imynatt@pangea.stanford.edu.

Folding and fracturing are intimately related processes in which the overburden stress, the remote tectonic stress, local folding related stresses and stress perturbations due to pre-existing fractures all influence new fracture formation. As a case study, we examine the relationship between the current fold geometry and fractures of Raplee Monocline, a Laramide aged, ~14-km long fold in Utah. The study involves three distinct parts: 1) Field based characterization of the fractures on and around the fold; 2) development of accurate models of the fold's geometry using high resolution data collected by ALSM; and 3) analysis of the fold's shape using the concepts of differential geometry. Field observations of fracture characteristics in different stratigraphic units are summarized in conceptual models of five stages of fracture evolution. We then develop an algorithm to extract elevation points from specified bedding surfaces identified in the ALSM high-resolution topographic data and interpolate fold geometry between topographic exposures of these bedding planes in the landscape. Using algorithms based on

differential geometry, the shape characteristics of fold models of Raplee Monocline can be precisely quantified. Specific geometric characteristics of the fold model, such as magnitude and direction of maximum curvature, are compared to the observed fracture characteristics.

## Speaker Biography

Ian Mynatt is a current Ph.D. candidate under David D. Pollard and Office of Technology Licensing Fellow at Stanford University. He received his B.S. in Geology from Western Washington University.

## Investigation of the Silver Fire Landslide, South Fork American River Canyon, El Dorado, California

by Stewart, Corinne S., Pacific Geotechnical Engineering, 16055-D Caputo Drive, Morgan Hill, CA 95037 and Department of Geology, San Jose State University.

In 1997, the geology and slope stability of a 150mile long stretch of the South Fork American River Canyon adjacent to Highway 50 was mapped by the California Division of Mines and Geology. The 3-acre Silver fire Landslide, located about 28 miles east of Placerville, and is one of 24 landslides within this stretch identified as having the potential to impact Highway 50.

A detailed investigation of the stability and controlling mechanisms of the Silver Fire Landslide is in progress. Detailed geologic mapping (1:750) documents that Paleozoic Shoo fly schists and gneisses, Cretaceous diorite and granodiorite, and Tertiary Mehrten volcanics underlie the slide area. Slide morphology was mapped at a scale of 1:750. The uppermost portion of the landslide is a rotational failure. Distinct, fresh head and lateral scarps are evidence of slide movement within the last several years. The majority of the slide consists of debris flow material with transverse tension cracks and lateral pressure ridges.

The California Department of Transportation (Caltrans) installed real-time monitory devices, including a geophone, rain gauge, piezometer, and two pairs of extensometers, on the slide in 1997. Data from this monitoring correlate slide movement with rainfall and changing groundwater elevations. Soil samples from the base of the headscarp and at a depth of 8 feet in the transition zone between rotational failure and debris flow movement were taken for determination of grain size, Atterberg limits, and shear strength. Caltrans has installed vertical and horizontal drains for dewatering the slope.

## Speaker Biography

Corinne holds a BS in Geology from San Jose State University, where she is currently working on her MS in Geology. Corinne currently works as a staff geologist for Pacific Geotechnical Engineering in Morgan Hill. Her favorite investigations involve logging trenches and large diameter borings.

*See over for AEG Foundation Challenge*

# SPECIAL AEG FOUNDATION CHALLENGE PRESENTATION AT OUR MARCH MEETING

The AEG Foundation is the tax-efficient way for you to support your profession. March is Student Speaker Night and the Foundation will be awarding five scholarships this year. You will learn about them as well as the Foundation's other programs that support both students and advanced practitioners in environmental and engineering geology.

I am proud to announce that some of our San Francisco Section members have stepped up to the plate and put together a challenge opportunity for our March meeting. Together, they will match any donation others make or pledge at the March meeting dollar for dollar. This doubles the effectiveness of your contribution! So, come prepared to join the ranks of philanthropists and contribute to the future of our profession!