UC&T SEMINAR SERIES

WEDNESDAY, October 14th at NOON in BB W210

- Lunch Provided –

Richard Bearce – Post Doctoral Researcher, UC&T

His current areas of research include DC resistivity monitoring of soilcrete columns and characterizing the electrical properties of conditioned soil for TBMs.

Using Electrical Push Probe to Provide Non-Destructive Estimate of Jet Grout Column Geometry

Jet grouting is a common ground improvement technique that mixes grout (water and cement) with in-situ soil to form soilcrete columns in the subsurface. These columns have many uses including underpinning foundations, creating hydraulic barriers, slope stabilization, etc. By design, soilcrete columns are cylindrical, but the turbulent grout/soil mixing process used in jet grouting can result in geometric uncertainty. The inherent heterogeneity of field soils further complicates this issue. Adequate jet grout column performance requires diligent quality assurance and quality control, but current assessment techniques have limitations. Due to the required curing time and destructive nature, tests for geometry estimation are usually only performed on test columns, leading to uncertainty in performance of production columns. The DC electrical resistivity method exploits the resistivity contrast between the low resistivity soilcrete and the relatively higher resistivity in-situ soil to estimate the boundary between the two materials. While DC resistivity has been applied to jet grout columns in the past, a new approach utilizing a recoverable probe with directly coupled electrodes provides advantages over the existing approach. An electrical push probe was developed at the Colorado School of Mines and used to test soilcrete and jet grout columns. Results of preliminary field testing suggest that the electrical push probe approach is readily implementable on production columns and can provide a rapid, non-destructive estimate of jet grout column diameter using a recoverable/reusable device.

Eric Poeck – PhD candidate, Mining

He has participated in a wide range of mining engineering projects with SRK consulting and gained experience in numerical modeling while working for Itasca Consulting Group.

Energy Concepts in the Failure of Coal Pillars

A coal bump is characterized by the sudden failure of one or more pillars and an associated release of kinetic energy. Although the geologic conditions surrounding coal bumps are often similar, their occurrence and magnitude are difficult to predict. Eric's research has involved the development of an approach to assess the potential for coal bumps in room and pillar mines through the calculation of energy transfer and consideration of softening material properties. Back analyses were performed on the collapse of a room and pillar coal mine with an associated 3.9 local magnitude seismic event. Numerical models were constructed to evaluate the effect of a variety of loading conditions and material properties on the unstable failure of coal pillars during progressive mining, and the extent of unstable failure was quantified by calculating the kinetic energy released. Through parametric analysis, it was found that the implementation of softening material properties in both the coal and the coal/rock interface resulted in the greatest release of energy, and a large-scale model of the mine with the selected material properties produced a series of failures which most accurately reflected events leading up to the collapse.

Questions? Dig in with us at uct.mines.edu or contact us uct@mines.edu

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