Critical State Material Behaviour and Implications to Sub-surface Operations

Rockfield are delighted to have added to their repertoire of training courses by providing a short-course on Critical State Material Behaviour and Implications to Sub-surface Operations. This course has been designed to be provided through a variety of web-based teleconference facilities to suit the client.

Day 1

Introduction to stress and strain concepts for sub-surface materials

- Stress components
- Elasticity – Young's modulus and Poisson's ratio, anisotropy
- Poro-elasticity (pore pressure and mechanical interaction)
- Elasto-plastic models; how they work

Introduction of non-critical state yield material models

- Brief description of critical state and non-critical state
- Mohr Coulomb, Drucker Prager, Modified Lade – description and examples
- Limitations of non-critical state models

Day 2 & 3

Critical State material models

- Critical state concept – volumetric changes in strength
- Poro-elastic laws
- State Boundary or Yield Surface and Critical State Line
- Plastic Potential Surface – Associative and Non-Associative
- Hardening/Softening Law
- Localisation/Regularisation Effects
- Additional Advanced Features
    - Rate dependency and creep
    - Anisotropic
    - Sub-loading Surface
    - Non-associated
    - Water-weakening

Day 4

Exercises

- Lab data interpretation
- Characteristics of generic sub-surface materials – sandstone, mudstones, shales
- Material model components required for critical state models, and how to determine
- Stress path examples – Uniaxial compression test, Hydrostatic compression test, Reduced triaxial extension, Cylindrical triaxial compression

Day 5

Field examples of material behaviour and associated implications to sub-surface operations

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