

**FLAC3D Training Course**  
**Goa, India**  
2008

**Day 1**

- ***Introduction to FLAC3D***
  - Overview of potential applications and capabilities in geo-engineering analysis and design
- ***Introduction to the Graphical Interface***
  - Command-driven operation
  - Menu-driven operation
  - Simple tutorial
- ***FLAC3D Theoretical Background***
  - Explicit Finite-Difference solution
- ***Practical Exercise:***
  - Modelling a strip footing – determine bearing capacity
- ***FLAC3D Operation***
  - Installation and operation procedures
  - Manual, examples and general assistance
  - File management
  - Sign convention and System of units
  - FLAC3D nomenclature
  - Solution procedure
- ***Grid Generation***
  - Primitive shapes
  - Grid altering
  - Adding Interfaces
- ***Practical Exercises:***
  - Grid generation exercises
  - Generating complex shapes
  - Use of third-party modelers (3DShop-KUBRIX)
- ***Basic Material Models***
  - Assigning models and properties
  - Assigning interface properties
- ***Boundary Conditions / Initial Conditions***
  - Applying boundary conditions
  - Initialising variables
  - Setting global conditions
- ***Solution***
  - Solving for force equilibrium
  - Cycling to monitor material failure

**FLAC3D Training Course**  
**Goa, India**  
2008

## Day 2

- **Introduction to FISH**
  - FISH variables, arithmetic, syntax and data types
  - Writing FISH functions
  - Simple exercises
  - Advanced topics
    - boundary conditions on complicated grids
    - inset
    - gradual excavations (ZONK3D)
    - plotting tricks (contours on NULL zones)
    - extracting data (plot extract)
  
- **Advanced material models**
  - Characteristics of soil and rock
  - Constitutive models in FLAC3D to represent continuum and discontinuum behaviour
  - Selecting appropriate material models and properties
  - CPP UDMs (User Defined Models)
  - changing material properties during cycling
  
- **Introduction to effective stress and groundwater analysis**
  - Effective stress analysis
  - Governing equations for transient fluid flow and coupled analysis
  - Recommended approaches for fluid flow – mechanical calculations
  
- **Factor of Safety Calculation**
  - Implementation of the strength reduction method in FLAC3D
  - slope stability analysis exercise
  
- **Soil/Rock Structure Interaction**
  - Why use structural elements?
  - Types of structural elements in FLAC3D:
    - Surface Support Elements:
      - Beam elements\*
      - Shell elements\*\*
      - Liner elements\*\*
    - Shear Support Elements:
      - Cable elements\*
      - Geogrid elements\*\*
    - Shear and Normal Support Elements:
      - Pile elements\*
      - Rockbolt elements\*
      - Embedded liner elements\*\*
  - - \* Linear element with 2 end nodes
    - \*\* Three-noded flat finite elements
  - How do SELs communicate with the main grid?
    - links and attach conditions
  - Stress recovery
  
- **Practical Exercises**