AGENDA

February 13~15, 2020
Energy Geosciences Division
Lawrence Berkeley National Laboratory
Berkeley, California

Instructors
Yingqi Zhang
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Thursday, February 13, 2020

Morning Session
9:00 am Welcome, Introduction, Safety
9:15 am Introduction
- Modeling and Course objectives
- TOUGH history and applications
9:45 am Computer Setup & Coffee Break
10:00 am Review of Multiphase Flow
- Phases, components, phase transitions, governing equations, fluid and porous-medium properties, equation of state, non-isothermal and other processes
11:00 am Break
11:10 am Continue: Review of Multiphase Flow
12:00 pm Working Lunch – Discussion of TOUGH in General

Afternoon Session
1:00 pm Numerical Methods in TOUGH
- Integral finite difference method, space and time discretization, Newton-Raphson iterations, linear equation solvers, weighting schemes
2:00 pm TOUGH Overview
- Capabilities, code architecture, basic input and output concepts
2:30 pm Break
2:45 pm Building a TOUGH Model
- Material properties (Problem 1a)
- Mesh generation (Problem 1b)
5:00 pm Fractured Rocks
5:30 pm Adjourn
6:00 pm Working Dinner
Friday, February 14, 2020

Morning Session

9:00 am  Continue – Building a TOUGH Model
- Initial and boundary conditions (Problem 1c)
- Computational parameters (Problem 1d)
- Explore (e.g., Problem_OneElement, EOS 9 for problem 1, and comparison with EOS3)
  (Coffee break between)

11:30 am  Examples of Tracer tests in Literature

12:00 pm  Working Lunch – TOUGH3 features

Afternoon Session

1:00 pm  Injection of CO₂ in a Saline Aquifer
- Introduction to CO₂ sequestration related EOS
- Introduction to ECO2N
- Hands-on computer exercise (Problem ECO2N)
- Non-isothermal simulation
- Variable injection rate
- Permeability reduction due to salt precipitation
- Post-injection period: pressure recovery and phase redistribution
- Effect of relative permeability functions
- Introduction to hysteresis
- Hands-on computer exercises, including quick-and-dirty plotting with Excel
  (Coffee break between)

5:30 pm  Adjourn
Saturday, February 15, 2020

Morning Session

9:00 am  Model Tracer Tests in a Geothermal Reservoir
- Introduction to EOS1 for modeling geothermal reservoir
- Hands-on computer exercise
- Problem variation
  (Coffee break between)

11:30 am  Phase Change in a Non-isothermal Two-Phase, Two-Component System
- Hands-on computer exercise (Problem PC)
- Primary variables, initialization, variable switching

12:30 pm  Working Lunch – General Discussion and Questions