



AGENDA

February 13~15, 2020

Energy Geosciences Division Lawrence Berkeley National Laboratory Berkeley, California

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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 am 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