STOMP Short Course

Center for Earth and Environmental Sciences
University of Hyderabad
2-5 January 2006

STOMP, an acronym for subsurface transport over multiple phases, is a scientific tool for simulating multifluid subsurface flow and transport, which complements other analytical capabilities developed by the Pacific Northwest National Laboratory's Hydrology Group. The simulator was specifically designed to provide scientists and engineers from varied disciplines with multidimensional analysis capabilities for modeling multifluid subsurface flow and transport phenomena. Developed with support of the U.S. Department of Energy, the simulator's modeling capabilities address a variety of subsurface environments, including nonisothermal, nonaqueous phase liquids, volatile organics, supercritical carbon dioxide, saline brines, clathrate hydrates, and ice. The STOMP Short Course, taught by the code developers, provides new users with an introduction to applying the simulator. The course combines lectures and laboratories; where, students are guided through ten simulation problems, designed to demonstrate the simulator's features. Simulation problems vary in complexity, including saturated and unsaturated flow, solute transport, salt-water brine, nonaqueous phase liquid flow, volatile dense nonaqueous phase liquid flow, partition tracers, carbon dioxide sequestration, and nonisothermal coupled thermal and hydrologic transport. During the laboratory sessions, students work in pairs or individually on workstation computers, affording hands-on experience with the simulator. Each student will receive a short course manuscript that provides a problem description, input file, suggested exercises, and solutions to selected exercises. Lecture topics address documentation, governing equations, constitutive relations, numerical solution schemes, algorithms, applications, parallel computing, and future directions for the simulator. To encourage the open exchange of scientific ideas, the STOMP simulator is provide as source coding, allowing students and researchers to modify the code to meet their research needs. Complete descriptions of the short course problems and further information about the STOMP simulator can be found on its website (http://stomp.pnl.gov).

Contacts:

Dr. Mark White, P.E.
Hydrology Group
PNNL
Tel: 509.372.6070
Email: mark.white@pnl.gov

Dr. Mart Oostrom
Hydrology Group
PNNL
Tel: 509.372.6044
Email: mart.oostrom.pnl.gov

Dr. Prasad Saripalli
Biotechnology and Ecotoxicology Group
PNNL
Tel: 509.376.1667
Email: prasad.saripalli@pnl.gov

Battelle
The Business of Innovation

STOMP Subsurface Transport Over Multiple Phases

Pacific Northwest National Laboratory
Operated by Battelle for the U.S. Department of Energy

STOMP Short Course

Center for Earth and Environmental Sciences
University of Hyderabad
2-5 January 2006

Monday, January 2, 2006

8:30 Orientation: Introductions and computer setup

9:00 Lecture: *STOMP Simulator Overview*

10:00 Break

10:15 Laboratory: Problem 1. Aqueous saturated and unsaturated flow

12:00 Lunch

1:30 Laboratory: Problem 2. Flow in a multi-aquifer system

3:00 Break

3:15 Laboratory: Problem 3. Solute transport

4:45 Adjourn

Tuesday, January 3, 2006

8:30 Orientation: Review and questions

9:00 Lecture: *An Introduction to STOMP-WS, STOMP-WO, and STOMP-WOA*

10:00 Break

10:15 Laboratory: Problem 4. Salt water intrusion

12:00 Lunch

1:30 Laboratory: Problem 6. NAPL infiltration and redistribution media

3:00 Break

3:15 Laboratory: Problem 7. DNAPL vapor behavior in unsaturated porous media

4:45 Adjourn

Wednesday, January 4, 2006

8:30 Orientation: Review and questions

9:00 Lecture: *An Introduction to STOMP-CO2 and STOMP-HYD*

10:00 Break

10:15 Laboratory: Problem 11. Radial flow of supercritical CO_2 from an injection well

12:00 Lunch

1:30 Laboratory: Problem 12. CO_2 discharge along a fault zone

3:00 Break

3:15 Laboratory: Problem 15. Hydrate dissociation by thermal stimulation

4:45 Adjourn

Thursday, January 5, 2006

8:30 Orientation: Review and questions

9:00 Laboratory: Problem 16. Hydrate dissociation by depressurization above the Q point

10:00 Laboratory: Problem 17. Hydrate dissociation by depressurization below the Q point

10:45 Break

11:00 Lecture: *An Introduction to STOMP-WAE and STOMP-WAE-B (Surface Barriers)*

12:00 Lunch

1:30 Laboratory: Problem 10. Simulation of countercurrent flow and heat transport with local evaporation and condensation (natural heat pipe)

3:00 Break

3:15 Laboratory: Problem 13. Simulation of a bare surface barrier

4:00 Laboratory: Problem 14. Simulation of a sparsely vegetated surface barrier

4:45 Adjourn