

Training Course on the CATHY (CATchment HYdrology) Model
University of Padova, Italy, September 10–14, 2012

Lecturers

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Programme

Monday, September 10

Morning session, 9:00–13:00

1. Hydrology and hydrogeology: basic definitions, physical properties, essential principles
2. Darcy's law, groundwater flow, Richards' equation
3. Overview of the CATHY model

Afternoon session, 15:00–19:00

4. Structure of the CATHY model
5. Presentation of student modeling projects

Tuesday, September 11

Morning session, 9:00–13:00

6. Some preliminaries on modeling
7. Fundamentals of numerical calculus and finite element methods
8. Numerical resolution of the subsurface flow equation in CATHY

Afternoon session, 15:00–19:00

9. CATHY application: 1D infiltration under dynamic forcing and surface ponding

Wednesday, September 12

Morning session, 9:00–13:00

10. Surface hydrology: linking terrain topography, hydraulic geometry, and flow dynamics
11. Modeling overland and channel flow in CATHY
12. Digital elevation model (DEM) pre-processing for catchment delineation and drainage network extraction

Afternoon session, 15:00–19:00

13. CATHY application: DEM pre-processing examples
14. Surface–subsurface coupling in CATHY

Thursday, September 13

Morning session, 9:00–13:00

15. Mass transport and mass transfer phenomena: a quick review
16. Modeling solute transport: the advection-dispersion-reaction (ADR) equation
17. Coupled flow and transport modeling: variable density phenomena and the seawater intrusion problem
18. The CATHY coupled flow–transport model and the CODESA variable density model
19. Finite volume methods

Afternoon session, 15:00–19:00

20. CATHY application: pre-processing example – NRW DEM
21. CATHY application: overland and subsurface flow on a sloping plane

Friday, September 14

Morning session, 9:00–13:00

22. Introduction to data assimilation
23. Data assimilation in CATHY: nudging, ensemble Kalman filter, and particle filtering
24. CATHY application: data assimilation examples

Afternoon session, 15:00–19:00

25. Work on and discussion of student modeling projects