

The lectures on inverse problems in hydrology will be focused on several topics related to the calibration of models to simulate groundwater flow and contaminant transport. A specific emphasis will be put on stochastic methods. During all the lectures some examples from real case studies will be illustrated and discussed.

Lecture 1. Groundwater flow inversion.

Groundwater flow equation, characteristics of the equation, nature of the solution, dependence on physical parameters.

Formulation of the inverse problem for groundwater flow modeling.

Lecture 2. Solute transport inversion.

Transport equation in porous media (advection-dispersion equation), characteristics of the equation, nature of the solution, dependence on physical parameters.

Formulation of the inverse problem for solute transport in groundwater. Specific issues with concentration data.

Lecture 3. Stochastic inversion.

Motivations for stochastic formulations of the inverse problem.

Conditional simulation and conditional expectation.