Groundwater modeling: flow simulation

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Summary
The first part of the slide show consists of reminders about the basic concepts and equations of saturated groundwater flow in steady-state and transient conditions. Then, the boundary conditions (BCs) are discussed and the different possibilities are illustrated.
The most common numerical techniques used to solve groundwater flow are the Finite Difference, Here, the Finite Difference method is presented into detail and on simple conceptual cases in order to keep the mathematical description relatively simple. Explicit, implicit, Crank-Nicolson and Galerkin time integration schemes are described. Useful recommendations are given for the practitioner in terms of spatial and temporal discretization and other conceptual choices. The Finite Element and Finite Volume methods are summarized in a few final slides.
The following long list of references is provided in order to allow the student/researcher to go into more detail on the subject. The references are used and accordingly cited in the associated slide show. Specifically for BCs discussion, a list of provided references from the author and his research team allows finding practical examples of BCs choices in various practical cases.

Key words
Deterministic model, groundwater flow, saturated conditions, equations, boundary conditions, Finite Difference Method (FDM), Finite Element Method (FEM), Finite Volume Method (FVM), time integration scheme, explicit time integration, implicit time integration, Crank-Nicolson scheme, Galerkin scheme, stability criterion.

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