

Week 6

6.1. Boundaries

Solving physical equations in mathematical models requires the initial conditions and boundary conditions.

Initial conditions include the hydraulic variables that define the flow system at the beginning of any modeling or simulation.

For example, water level and soil moisture.

Types of boundaries in groundwater flow system:

Specific head (Dirichlet condition)

Specific flow (Neumann condition)

Head-dependent flow (Cauchy or mixed condition)

Sometimes, the boundary condition could play an important role in the selection of numerical models (e.g., finite difference or finite element).

Boundaries in watershed

No-flow boundary, constant river head, rain-induced recharge, and leakage boundary.

Distant and hydraulic boundaries

Flow system under Dams and regional flow systems.

6.2. Simulating boundaries

Specific head

Specific flow, no-flow boundaries

Head-dependent flow

6.3. Internal boundaries

Head dependent, river or lake, drain, spring, evapotranspiration.

6.4. Sources and sinks

Wells: withdraw or injection (Q).

Flux across the water table.

Recharge estimation (field measurement, water balance calculation, soil hydrology modeling).

Leakage

Calculate the flux exchange using Darcy's law or through field measurement.