

CHAPTER 4

Model Dimensionality and Setting Boundaries

COMMON MODELING ERRORS

- The modeler uses specified head and head dependent boundaries (HDBs) to represent surface water features but neglects to check whether the amount of water exchanged with the groundwater system is reasonable and consistent with the conceptual model. Specified head boundaries and HDBs (Box 4.5) may transfer unrealistic amounts of water into or out of the problem domain.
- A drain is used to simulate a surface water feature that has both gaining and losing reaches. Basic representation of a drain using an HDB does not allow water to enter the groundwater system and therefore the drain HDB cannot simulate loss of water from the drain.
- The modeler uses a 2D profile model to simulate pumping wells. A profile model assumes that there is no flow through the sides of the profile and therefore cannot simulate radial flow to a well. Pumping wells must be simulated using an axisymmetric profile model, a 2D areal model, or 3D model.
- A 2D profile model is not aligned along a groundwater flowpath. Profile models simulate flow only within the thickness of the profile and must be aligned with groundwater flow.
- The modeler selects equipotential lines to define hydraulic boundary conditions for a model designed to determine the long term impacts of pumping. Under field conditions, pumping may affect heads at the locations of the selected equipotential lines used to specify boundary conditions thereby invalidating the model's boundary conditions. Furthermore, specified head conditions based on equipotential lines provide the model with an unlimited supply of water and thereby may underestimate the impact of pumping by incorrectly keeping simulated drawdowns low.
- A model to determine the long-term impacts of pumping uses hydraulic boundary conditions defined by streamlines to set lateral no-flow boundaries. In the field, the effects of pumping may reach the hydraulic no-flow boundaries and inappropriately affect the expansion of the cone of depression, thereby causing simulated drawdowns that are too large.

- The water table is simulated using specified heads (Box 4.6). The model simulates unrealistic nested flow systems owing to unrealistic flows into and out of the water-table nodes.