HID 362 _HOMEWORK 2

Simulation Capabilities of MODFLOW

Sadece kırmızı çerçeve içindeki metinleri çeviriniz!!! Dosyanın orijinaline aşağıdaki bağlantıdan ulaşabilirsiniz.

(https://pubs.usgs.gov/fs/FS-121-97/fs-121-97.pdf)

U.S. Department of the Interior
U.S. Geological Survey

Modeling Ground-Water Flow with MODFLOW and Related Programs

USGS science for a changing world

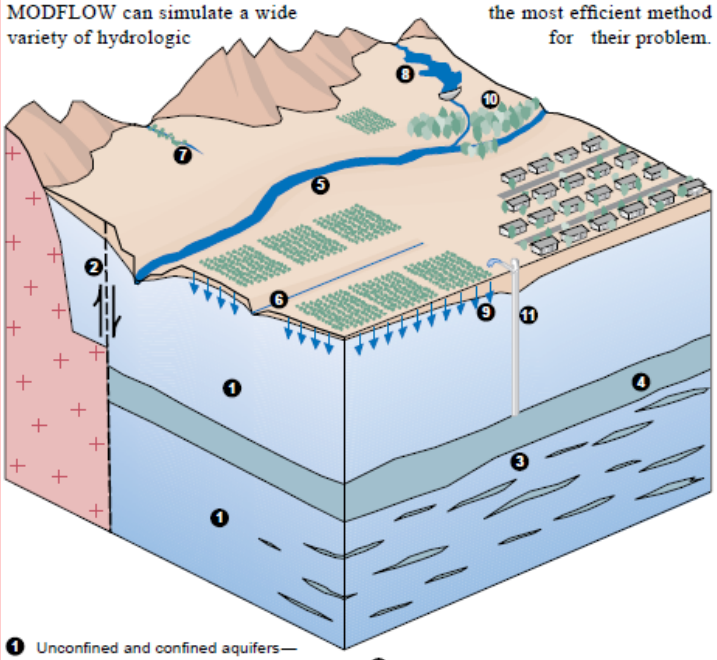
The modular finite-difference ground-water flow model (MODFLOW) developed by the U.S. Geological Survey (USGS) is a computer program for simulating common features in ground-water systems (McDonald and Harbaugh, 1988; Harbaugh and McDonald, 1996). The program was constructed in the early 1980's and has continually evolved since then with development of many new packages and related programs for ground-water studies. Currently, MODFLOW is the most widely used program in the world for simulating ground-water flow. The popularity of the program is attributed to the following factors:

- *The finite-difference method used by MODFLOW is relatively easy to understand and apply to a wide variety of real-world conditions.*
- *MODFLOW works on many different computer systems ranging from per-sonal computers to super computers.*
- *MODFLOW can be applied as a one-dimensional, two-dimensional, or quasi- or full three-dimensional model.*
- *Each simulation feature of MODFLOW has been extensively tested.*
- *Data input instructions and theory are well documented.*
- *The modular program design of MODFLOW allows for new simulation features to be added with relative ease.*
- *A wide variety of computer programs written by the USGS, other federal agencies, and private companies are available to analyze field data and construct input data sets for MODFLOW.*
- *A wide variety of programs are available to read output from MODFLOW and graphically present model results in ways that are easily understood.*
- *MODFLOW has been accepted in many court cases in the United States as a legitimate approach to analysis of ground-water systems.*

This publication outlines the major features of MODFLOW and several related programs and gives information on obtaining programs and documentation.

Simulation Capabilities of MODFLOW

MODFLOW is designed to simulate aquifer systems in which (1) saturated-flow conditions exist, (2) Darcy's Law applies, (3) the density of ground water is constant, and (4) the principal directions of horizontal hydraulic conductivity or transmissivity do not vary within the system. These conditions are met for many aquifer systems for which there is an interest in analysis of ground-water flow and contaminant movement. For these systems, MODFLOW can simulate a wide variety of hydrologic features and processes (fig. 1). Steady-state and transient flow can be simulated in unconfined aquifers, confined aquifers, and confining units. A variety of features and processes such as rivers, streams, drains, springs, reservoirs, wells, evapotranspiration, and recharge from precipitation and irrigation also can be simulated. At least four different solution methods have been implemented for solving the finite-difference equations that MODFLOW constructs. The availability of different solution approaches allows model users to select the most efficient method for their problem.



1. Unconfined and confined aquifers—Ground-water flow and storage changes
2. Faults and other barriers—Resistance to horizontal ground-water flow
3. Fine-grained confining units and interbeds
4. Confining units—Ground-water flow and storage changes
5. Rivers—Exchange of water with aquifers
6. Drains and springs—Discharge of water from aquifers
7. Ephemeral streams—Exchange of water with aquifers
8. Reservoirs—Exchange of water with aquifers
9. Recharge from precipitation and irrigation
10. Evapotranspiration
11. Wells—Withdrawal or recharge at specified rates

Figure 1. Features of an aquifer system that can be simulated by MODFLOW.