

Synthetic streamflows and rainfall data are generated using a Markov process with an additive random component.⁽²⁰⁾ By suppressing the random component, deterministic simulations runs can be made. Hydrologic data are produced for each time increment of the simulation, and thus this phase of the computation is repeated seasonally as the solution proceeds.

(iii) Balance

At the start of each season's computations, the program evaluates the flow of groundwater from adjacent cells using Darcy's Law.

In general four flow vectors from adjacent cells are required to compute the drawdown in any cell during each season. If the transmissibility is written as T (permeability times the effective depth of the aquifer), it can be shown from theoretical considerations that the dimensionless parameter

$$C = \frac{\Delta t \cdot T}{(\Delta x)^2 S}$$

should not exceed 0.15 in order that the numerical solution by the finite difference method of the computer be a valid solution for the continuous pumping process of the prototype. That is, for a given value of Δx which is set by the project area, Δt should be selected so that the upper bound on C is maintained. It was found that 40 iterations (loopings) per season (i. e., $\Delta t = 1/120$ of a year) produced stable numerical solutions.

(iv) Feedback relationships

Following the computation of new ground water levels in all the cells, the feedback relations are evaluated for each cell in turn. If a cell has a well, the effluent is withdrawn and circulated in accordance with the prescribed operating parameters. No connection to adjacent cells is assumed in this phase of the computation since the feedback relations are defined for a given area with a horizontal water table. Phases (iii) and (iv) are executed during each season of the simulation.

(v) Write-out

Two arrays are provided as output for each season's run. Following the execution of the balance phase, the ground water elevation in each

(20)Maass, A., et al, Design of Water Resource Systems. Chapter 12, Harvard University Press (1962).