

2-D Modeling of Water Table Fluctuation Owing to Time Varying Recharge, Pumping and Leakage

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An analytical solution of a 2-D Boussinesq equation is presented to predict water table fluctuations induced by intermittently applied time-varying recharge and/or withdrawal from any number of recharge basins, pumping wells and leakage sites of different dimensions. The time-varying recharge rate (or withdrawal) is approximated by a number of linear elements of different lengths and slopes depending on the nature and duration of recharge/ withdrawal. The solution is obtained by using the extended finite Fourier Cosine Transform and its inverse. Application of the solution for prediction of water table fluctuations in the presence of recharging, pumping and leakage is demonstrated with the help of an example problem. Numerical results reveal that the nature of variation in the recharge and withdrawal rates have significant effects on the nature of water table fluctuation. These variations should be taken into account in groundwater resources management.