



## **Fluctuation Component of Groundwater Level Produced by Rainfall**

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Groundwater level fluctuations are generally produced by some man-made and natural factors. For an approximately confined deep-well, the fluctuation may consider as only produced by a few natural factors, such as Earth tides, sever changes of atmospheric pressure, heavy rainfall, and seismic waves and ignored the influences from man-made withdraws and recharges. Among these natural factors, rainfall is the major and time-variant influenced factor. Although a few previous studies have already discussed its influence model, but the hourly or daily accumulate precipitation was used in their studies. Now, heavy rainfall within a short-time is occasionally observed, so as to the response of groundwater level fluctuation is necessary to re-modify by using densely sampling interval of rainfall. In this study, the operations of convolution and the Wiener and Kalman filters are tried to calculate the rainfall response from groundwater level fluctuation observations. The results show that the near-surface water loading due to the rainfall will immediately make the groundwater level up and the rainfall influence coefficient of each time-interval is increased fast and reaches to a maximum at the time about 1 hour after rainfall, then, the coefficient also decays fast and linear-likely for the following 10 hours as estimated by the Wiener filter. However, the rainfall influence coefficient and time duration are dependent on the rainfall situation and the aquifer type in the well. Since the rainfall influence is time-variant, to get the better match between the estimate values and observations, the Kalman filter is further used to adjust the influence coefficients from the differences between the estimate values and observations for point to point.