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Study on the Variation of Groundwater Level under Time-varying Recharge

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The slopes of the suburbs come to important areas by focusing on the work of soil and water conservation in recent years. The water table inside the aquifer is affected by rainfall, geology and topography, which will result in the change of groundwater discharge and water level. Currently, the way to obtain water table information is to set up the observation wells; however, owing to that the cost of equipment and the wells excavated is too expensive, we develop a mathematical model instead, which might help us to simulate the groundwater level variation.
In this study, we will discuss the groundwater level change in a sloping unconfined aquifer with impermeable bottom under time-varying rainfall events. Referring to Child (1971), we employ the Boussinesq equation as the governing equation, and apply the General Integral Transforms Method (GITM) to analyzing the groundwater level after linearizing the Boussinesq equation. After comparing the solution with Verhoest & Troch (2000) and Bansal & Das (2010), we get satisfactory results.
To sum up, we have presented an alternative approach to solve the linearized Boussinesq equation for the response of groundwater level in a sloping unconfined aquifer. The present analytical results combine the effect of bottom slope and the time-varying recharge pattern on the water table fluctuations. Owing to the limitation and difficulty of measuring the groundwater level directly, we develop such a mathematical model that we can predict or simulate the variation of groundwater level affected by any rainfall events in advance.