A Visco-Elastic Model for Groundwater Level Changes in Cho-Shui River Alluvial Fan after the Chi-Chi Earthquake in Taiwan

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A visco-elastic model is developed to simulate the ground water level changes in the Cho-Shui River alluvial fan in Taiwan after the Chi-Chi earthquake. An analytical solution is derived with the assumption that no leakage occurred in confined aquifers during the co-seismic period. The solution is used to analyze the data collected from a high-density network of hydrologic monitoring wells in the Cho-Shui River alluvial fan. The simulated ground water level changes agree with the observations. The viscosity coefficient of the model was found to correlate with the hydraulic conductivity of the aquifer. The field observations and the simulations reveal the influence of geological structures and heterogeneity on the ground water changes and locations of sediment liquefactions in the alluvial fan during the Chi-chi earthquake. Possible applications to imaging subsurface hydraulic heterogeneity are discussed using information about ground water level changes induced by earthquakes.