Geophysical Research Abstracts
Vol. 16, EGU2014-1592, 2014
EGU General Assembly 2014

A two-dimensional analytical model describing groundwater level fluctuations in an anisotropic and bending leaky aquifer system near estuary

Hund-Der Yeh (2) and Mo-Hsiung Chuang (1)

(2) National Chiao Tung University, Graduate Institute of Environmental Engineering, Hsinchu, Taiwan (hdyeh@mail.nctu.edu.tw, 886-3-5725958), (1) Department of Urban Design and Disaster Management, Ming-Chuan University, Taoyuan, Taiwan (cmh5899@gmail.com, 886 -3-3507001 # 3283)

Tide-induced head fluctuation in a two-dimensional estuarine aquifer system is complicated and rather important in dealing with many groundwater management or remediation problems. The conceptual model of the aquifer system we considered is anisotropic, multi-layered with a bending estuarine bank, and subject to the tidal fluctuation effects from both the sea shore and estuarine river. The solution of the model describing the groundwater head distribution in such a coastal aquifer system is developed based on the method of separation of variables and a coordinate transformation applied to the river boundary at the bend with an angle of arbitrary degree to the line perpendicular to the sea shore. The solutions by Sun (Sun H. A two-dimensional analytical solution of groundwater response to tidal loading in an estuary, Water Resour. Res. 1997; 33:1429-35) as well as Tang and Jiao (Tang Z. and J. J. Jiao, A two-dimensional analytical solution for groundwater flow in a leaky confined aquifer system near open tidal water, Hydrological Processes, 2001; 15: 573–585) can be shown to be special cases of the present solution if the degree of the bending angle is zero. On the basis of the analytical solution, the groundwater head distribution in response to estuarine boundary is examined and the influences of anisotropy, leakage, hydraulic parameters, and bending angle on the groundwater head fluctuation are investigated and discussed.