Course: GW Flow and Contaminant Transport Modeling

Assignemnt #4: Transient simulation of a long term pumping test

There are 15 boreholes drilled on an area of 400 x 300 m. The drillings discovered a fine sand layer and an underlying gravelly sand. Please find the ground level and the thicknesses of the layers in the attached worksheet. There are four wells screened to the gravelly sand layer in which pumping is scheduled as described in the worksheet. The horizontal hydraulic gradient is 0,002 m/m in any direction upon your wish. The groundwater level is 2.5 m below the surface in the middle of the model. All not mentioned data can be freely chosen by the student but should be coherent to the soil type.

Tasks:

1. to build a transient model of the site with the given geometry and flow regime
2. to install monitoring wells to the model into both layers
3. to determine the transient flow field and to make a hydraulic head animation for both layers
4. to determine head-time curves for the pumping test period in representative locations of the model

Deliverables:

In printed form a short report of the problem with

- the details of the chosen data
- graphic presentation of potential fields, potential vs time curves (each monitoring well and each tested well, comparative graphs of wells screened to the same layer)
- the description and evaluation of results

Digitally (only at the end of semester)

- report in document form
- full dataset of the model
- plots in graphical form

Borehole data:

x	y	z	Thickness1	Thickness2
[m]	[m]	[m asl.]	[m]	[m]
-6,4	309,5	98,7	18,1	16,7
412,5	310,2	98,6	17,5	13,5
406,4	107,8	99,9	17,2	12,7
411,8	-6,2	99,3	19,1	17,1
-29,2	-25,6	98,9	19,7	16,6
103,5	190,2	98,8	22,4	18,6
209,4	235,1	100,4	21,3	16,4
322,0	114,5	98,2	21,5	16,2
182,6	103,1	100,9	23,0	17,3
48,5	251,9	98,6	20,4	17,1
345,4	268,6	98,3	20,8	16,0
360,2	50,1	100,3	21,0	18,0
130,3	30,7	99,4	20,6	16,5
52,6	76,3	99,2	19,9	17,1
200,7	157,4	100,5	24,7	19,5

Pumping schedule data (well locations can be determined by the student):

Time [d]	Well1	Well2	Well3	Well4
	Production(Pumping) rate [m3/d]			
1	0	120	0	50
2	0	120	0	50
3	0	120	0	50
4	0	120	0	50
5	0	120	0	50
6	50	120	100	0
7	50	120	100	0
8	50	120	100	0
9	50	120	100	0
10	50	120	100	0
11	0	180	100	100
12	0	180	100	100
13	0	180	100	100
14	0	180	100	100
15	0	180	100	100
16	0	180	100	100
17	100	180	0	100
18	100	180	0	100
19	100	180	0	100
20	100	180	0	100
21	100	240	0	50
22	100	240	0	50
23	100	240	0	50
24	100	240	0	50
25	100	240	0	50
26	0	240	120	50
27	0	240	120	50
28	0	240	120	50
29	0	240	120	50
30	0	240	120	50
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	100	0	150	0
6	100	0	150	0
37	100	0	150	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0