Abigail Kahler, HW3, The Challenge

**Chart, line chart

Description automatically generated1**

Type 1 boundary = specified heads

q = -K dh/dl

* The flow would be constant across the constant head boundaries if it were a homogeneous system. Here, in Figure 1, the low flow in the middle of each boundary corresponds to the lower K in the center of the grid.
* Chart

  Description automatically generated with medium confidenceWith steady state continuous flow, the boundaries are equally affected by the central low K. Conceptually, flow vectors become shortened as the water ‘backs up’ behind the low K box and slowly return to previous levels as the flow ‘catches up’ on the other side.

Figure Flux through constant head boundaries of 15m (left) and 10m (right)

Figure Head distribution across grid with center low hydraulic conductivity, rotated to align the y-axis with Fig. 1

Chart

Description automatically generated with medium confidence

**2**

Comparing the flow profiles (Fig. 3) shows how the effect of an area of low hydraulic conductivity propagates outward and gradually decreases with distance from its center. There is a large head gradient between the areas of high and low K, which causes the flux to significantly increase on either side of the inclusion. Inside the inclusion, with low K, there is a much smaller head gradient- reflected by the extreme drop in flux.

Figure 3 Flow along constant head boundaries and through the center of low K

**3**

I’m not sure I’m interpreting this question correctly. From the model, I know that Q = -6.25 m^3/day

For this table, I summed the flux along the boundary, which doesn’t add up. I also tried calculating Q by summing the fluxes along the boundary and dividing by the number of rows, which gave Q = 4.54 m^3/day. That is more reasonable but still does not match the model.

|  |  |  |  |
| --- | --- | --- | --- |
| **K (m/d)** | **Q (m^3)** | **K\_eq (m/d)** | **K\_eq calc (#4)** |
| .01 | 94.87 | .0038 | .0025 |
| .1 | 96.65 | .0038 | .025 |
| 1 | 104.17 | .0042 | .25 |
| 10 | 111.68 | .0045 | 2.5 |
| 100 | 111.68 | .0045 | 25 |

**4**

My approach must be off. I connected with a couple students and we each had different ways of looking at it. I’m having trouble interpreting the questions. Please know that I have put much more time into this than it shows.