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GWM21

<div align="center">HW 4 – correct figures</div>

1. Explain why the values are not constant along the boundary (relate to the definition of a Type I boundary). Explain the shapes of the flow distributions and why they are not the same for the left (inflow) and right (outflow) boundaries.

The values are not constant along the boundary because of Darcy's law. This is because as we are increasing our horizontal distance, dl, we see a change in dh (shown in equipotential graphs), Q (shown in flow vs. Y location graphs), and K values. This is why we don't see constant values along the boundary. The left and right boundaries for the flow graphs are not the same as we see a symmetrical pattern surrounding the well.

2. Add a series of the left-to-right flow along a line that passes through the center of the well [:,12]. How do you interpret the flow along this transect? Hint, also look at the flow along a transect just upgradient from the well [:,11].

These graphs at different transects show opposite flow values (one being the negative value of the other). For the center transect, we approach the well with slightly decreasing flow values and in the middle of the well, the flow values drop to about 0 for the center boundary. The left boundary of the center transect shows a slight increase in flow while the right shows a slight decrease in flow. This is because as it enters the well, there is a "pull" from the well that increases the flow and as it exits with less momentum, we see a lower flow value. The upgradient transect shows opposite values as right next to the well, we experience a pull that isn't "satisfied" where it can't actually be stuck within the well.

3. Then, look at the plot of equipotentials and flow vectors. Describe how water flows through the domain. To aid in your description, draw a line through all of the flow vectors that terminate in the well. This approximates the capture zone of the well. Use this to refine your description of the flow system, being as specific as possible about where water that ends up being extracted by the well originates on the inflow boundary.

So as we move towards the center of the well system, along the center line we see arrows pointing in the same direction with an increase in the magnitude of head values on the left and as soon as we enter the well, we see a sharp decrease in those values. The right side (boundary?) shows growing arrows that are still straight as we exit the well. The upgradient and downgradient transects show the vectors pointing towards the well with an increased head value as we approach the well and then show the same decreasing then increasing patterns as we enter and exit the well.
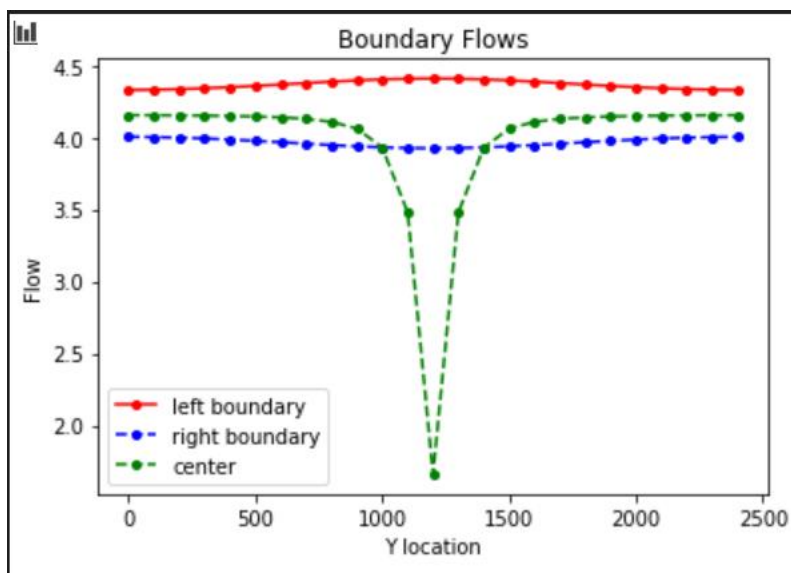
4. Then, look at the plan view drawdown plot. Why aren't the drawdown contours circles? Either explain why this is correct, or fix the plot.
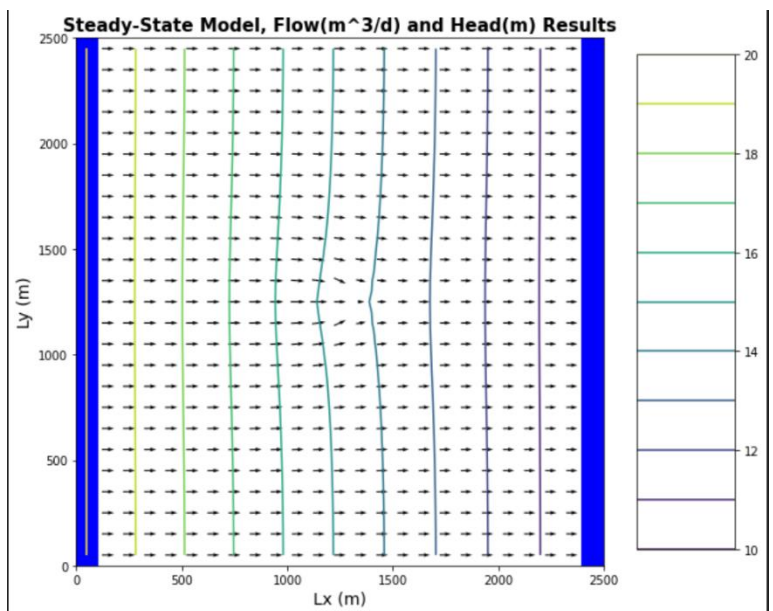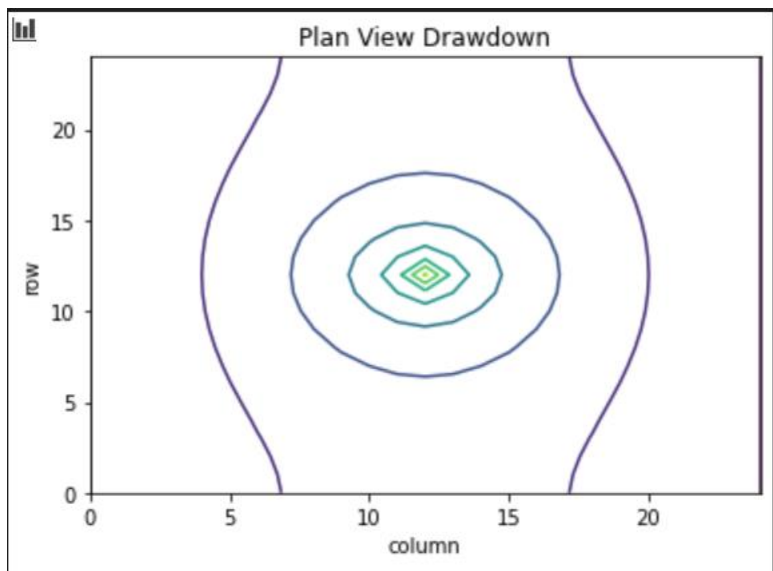
The drawdown plot aren't circles because as we enter the well, the change is so sudden that only specific flow values are captured before the values go to zero.

5. Move the well to [0,5,5]. Use all plots necessary to describe fully how water is flowing through the domain with the well in this location. Be sure to include the drawdown plot in your discussion - compare this plot to the equipotential and flow vectors. Something is not right about how the well location is shown. Fix it and explain what was wrong!!
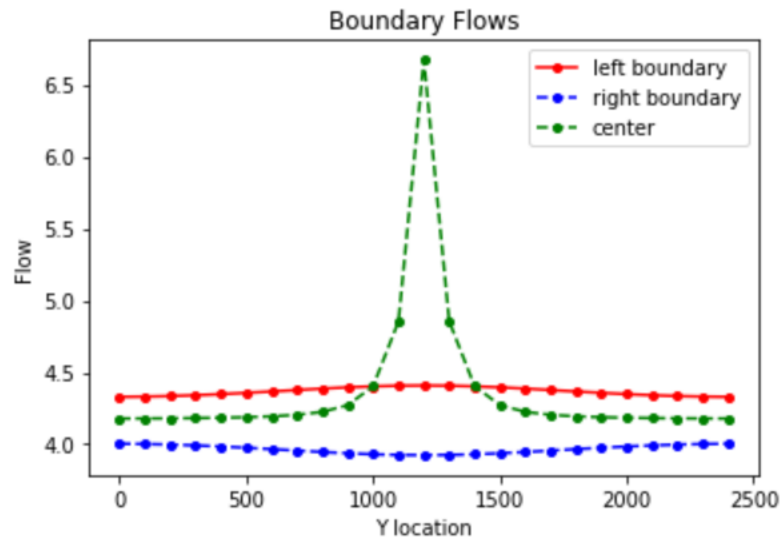
In the center transect with the center boundary, we see a general slight decrease in flow values and gradual increase as we enter and exit the well. Overall, the flow values are pretty low. We see a general increase in flow values with the right boundary but also with overall, low flow values. In the left boundary however, we see a sharp increase in flow values and then large but gradual decrease in flow values once it hits the well. The head values in the equipotential graph show similar characteristics of the previous location of [0,12,12] which does not really follow the flow graph. Not really sure what is wrong with the well or why it is doing this.
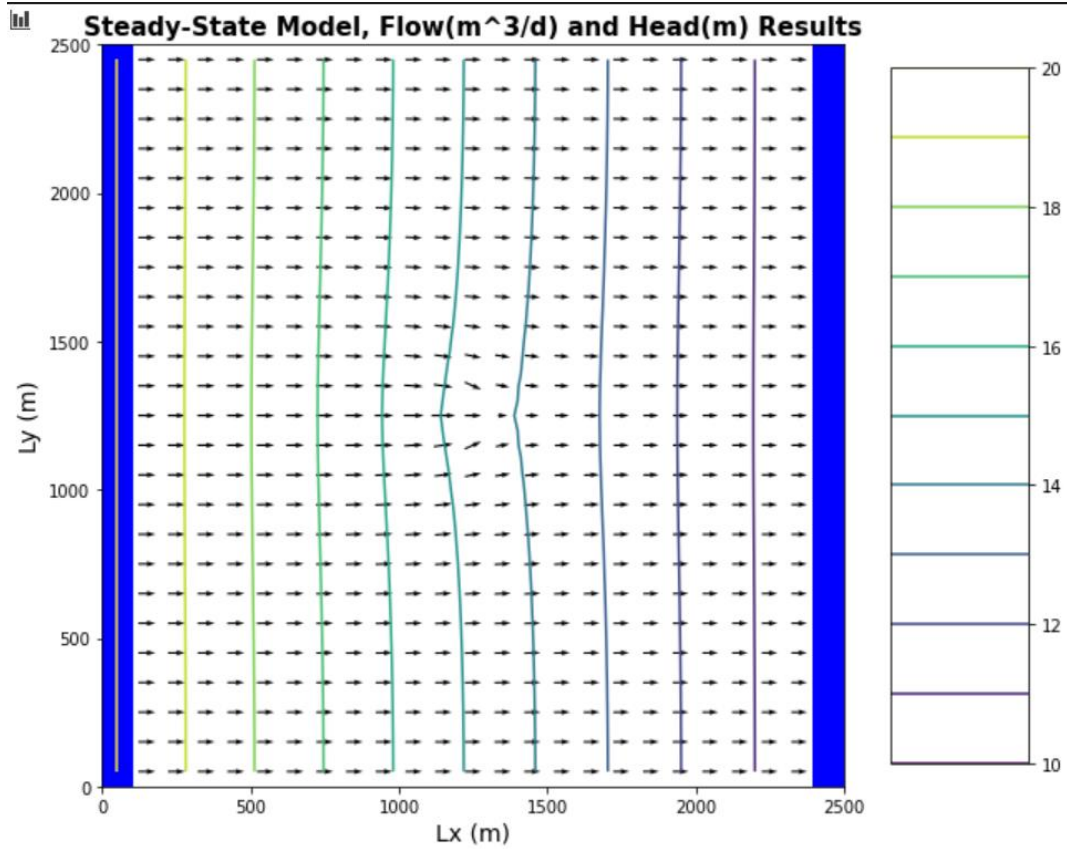
With center values, [0,12,12] flux of -10 and centered (at 12):

Plan View Drawdown

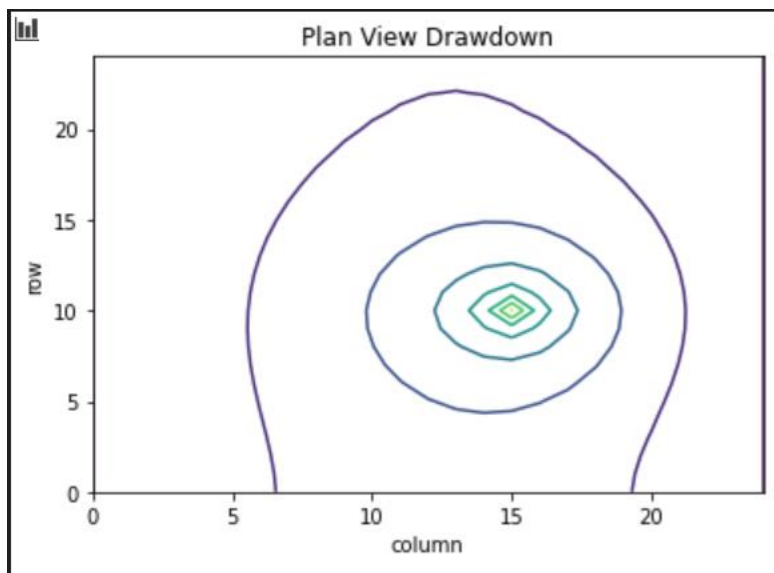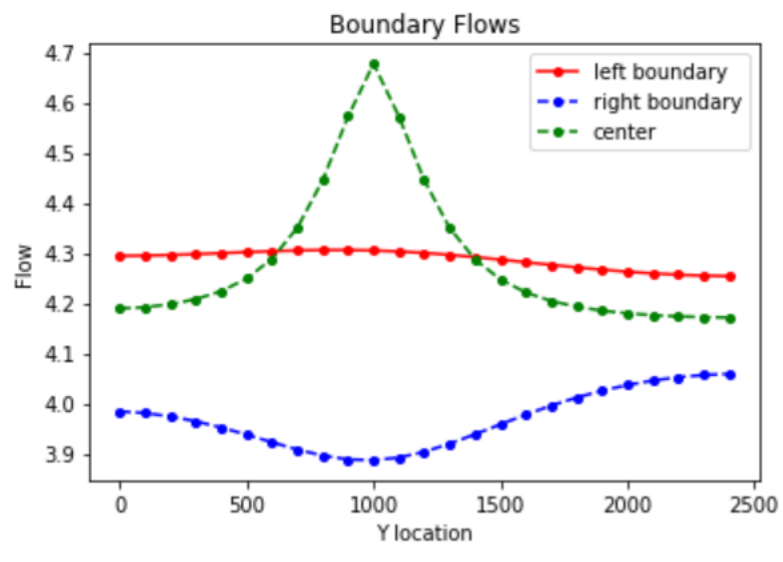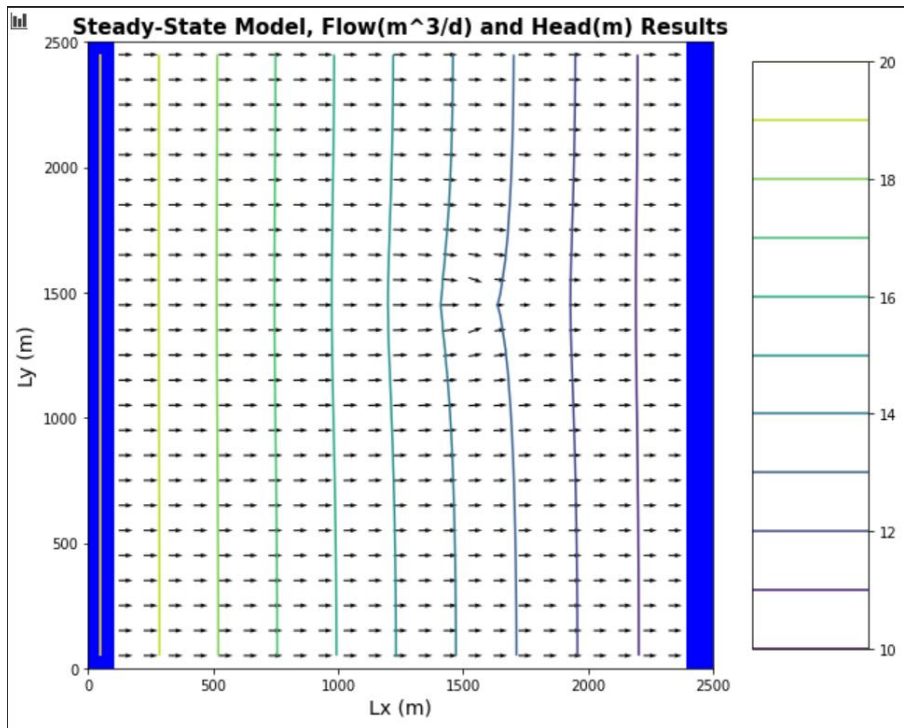Steady-State Model, Flow(m^3/d) and Head(m) Results

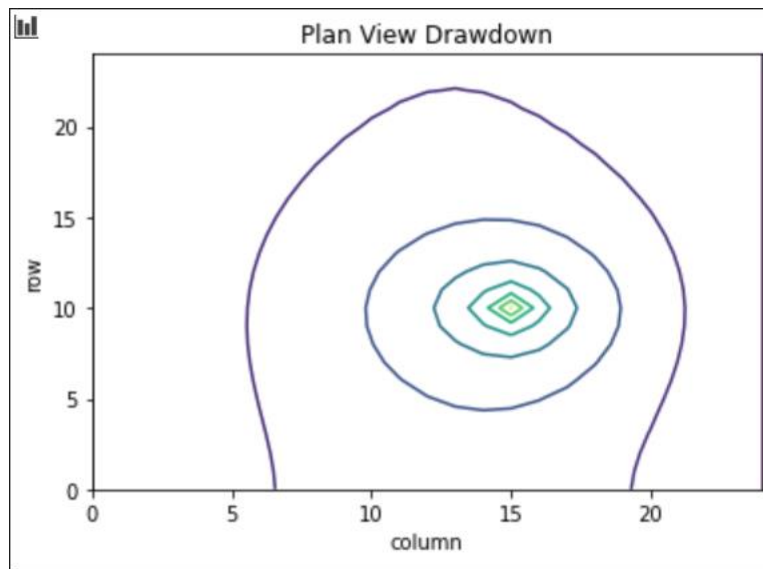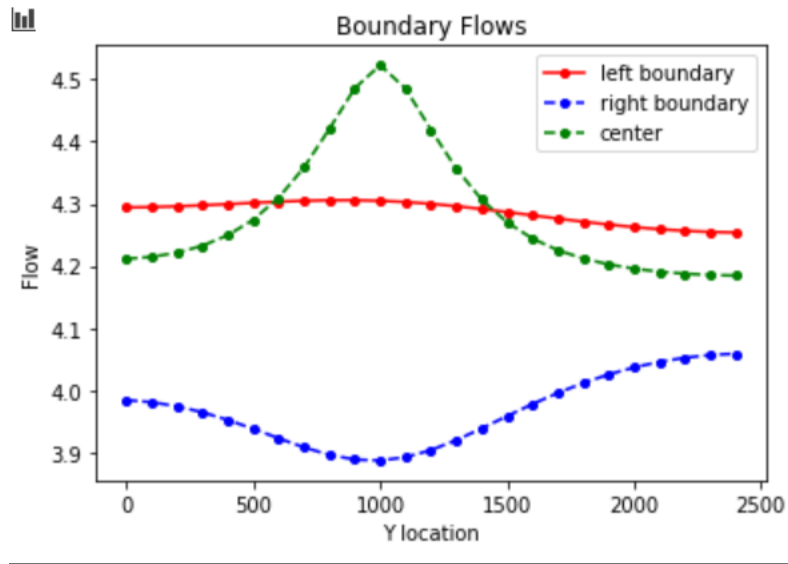With center values, [0,12,12] flux of -10 and not centered (at 11):

Boundary Flows

Plan View Drawdown

Steady-State Model, Flow(m^3/d) and Head(m) Results
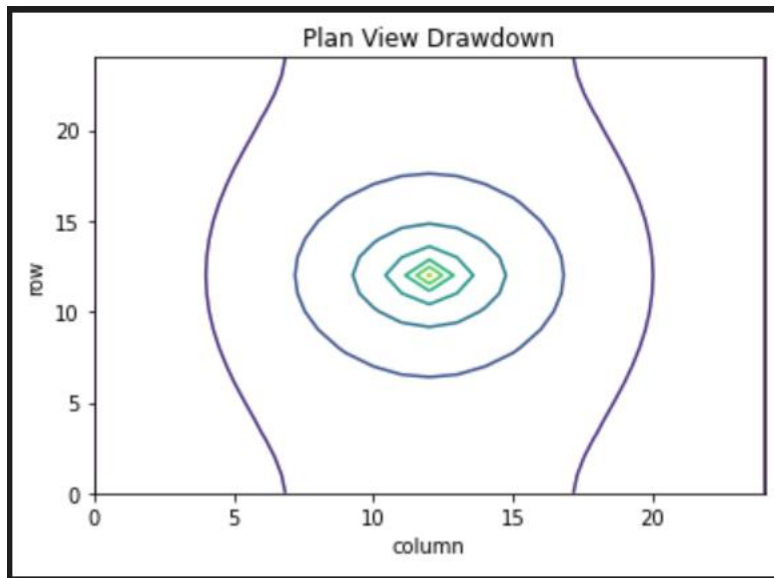
With center values, [0,10,15] flux of -8 and centered (at 12):

Boundary Flows

Flow

Y location

left boundary
right boundary
center

Plan View Drawdown
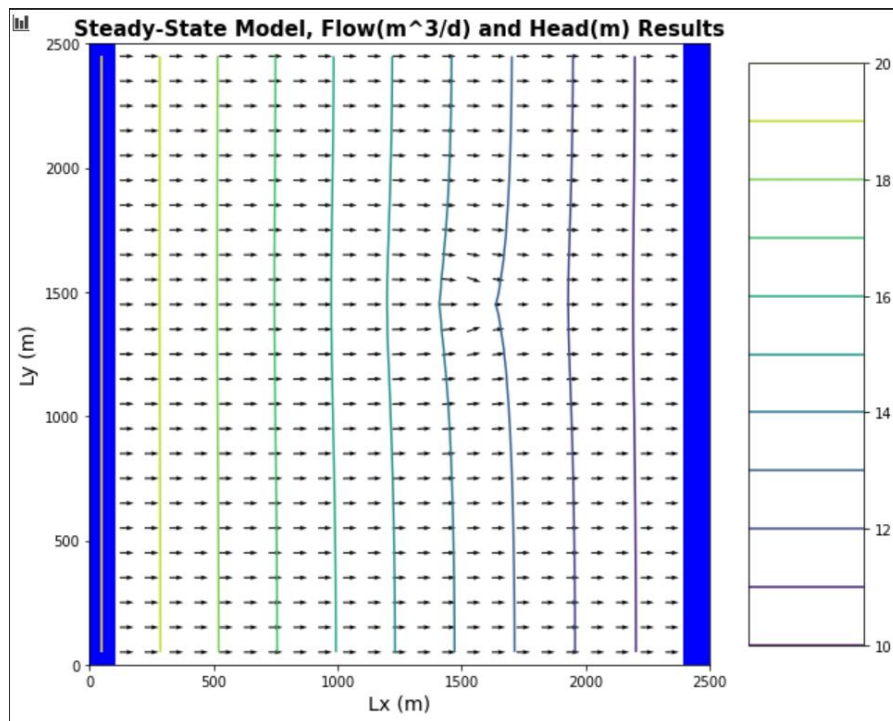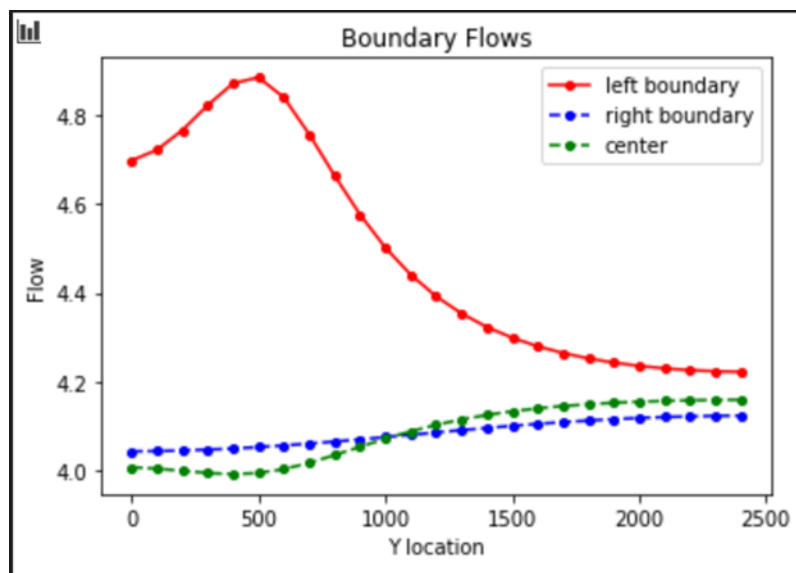
row

column

Steady-State Model, Flow(m^3/d) and Head(m) Results

With center values, [0,10,15] flux of -8 and not centered (at 11):

Boundary Flows

Plan View Drawdown

Steady-State Model, Flow(m^3/d) and Head(m) Results

With center values, [0,5,5] with flux of -10 and centered (at 12):

Boundary Flows

Plan View Drawdown

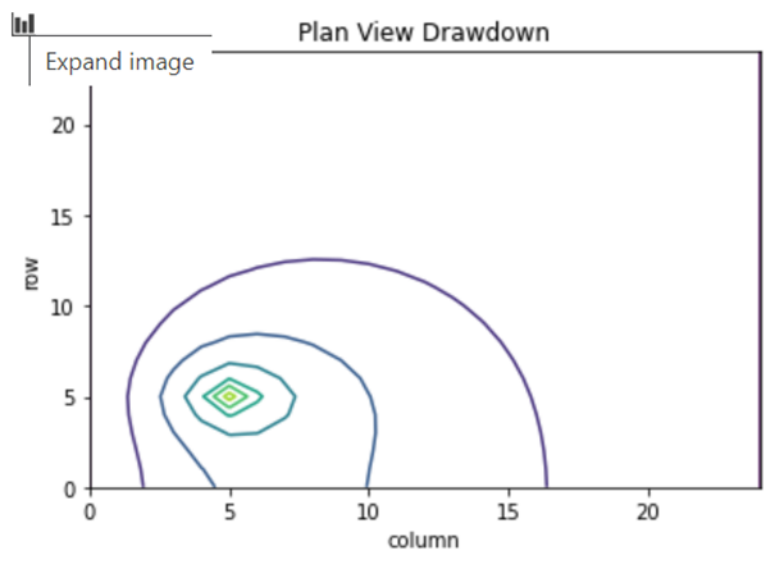Steady-State Model, Flow(m^3/d) and Head(m) Results

With center values, [0,5,5] with flux of -10 and not centered (at 11):

Boundary Flows

Plan View Drawdown

Steady-State Model, Flow(m^3/d) and Head(m) Results