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HWRS 482

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Challenge/Discussion/Glossary

**For the initial values of background and inclusion K, plot the flow into the left and out of the right boundary. (The code, as provided, makes this plot for you.)**

**Explain why the values are not constant along the boundary (relate to the definition of a Type I boundary).**

A type 1 boundary is a constant head boundary. The flow in and out of the left and right boundaries aren’t constant due to the change in head over the system.

**Explain why the flow distributions are the same for the left and right boundaries.**

The flow distributions are the same for the left and right boundaries

**Add a plot of the left-to-right flow along a line that passes through the center of the inclusion. What can you learn from comparing this distribution to that seen on the boundaries?**

What we can learn from comparing the flow along a line

**Compare the Keq calculated based on the total flow into and out of the domain to the harmonic and arithmetic mean K values calculated based on the area occupied by each medium (rather than the length for a 1D system). Can you draw any general conclusions about the impact of high or low K heterogeneities on the equivalent K for the flow system examined?**

The equivalent K for the flow system is higher when you use the arithmetic mean.

Discussion Questions

Does the equipotential distribution depend on the absolute or relative K values for the background and the inclusion? How would you use the model to test your answer?

Discuss what it means to say that, for steady state flow, there are equivalent Type I and Type II boundary conditions. How might this be useful in practice?

What would you find if you altered your model to consider unconfined conditions??

Glossary questions:

What is FloPy? How is it different from MODFLOW and how does it interact with MODFLOW? What are some advantages (easy) and disadvantages (harder) of using FloPy rather than building MODFLOW models manually?

Given that the distribution of K is always heterogeneous at the small scale, what does it mean to provide one K value per grid cell? What are the implications for the K values we use in models in general? How does this change if we are modeling with different spatial resolutions (i.e. grid cell sizes)?

What does it mean for a groundwater model to be confined? How does this simplify calculations of groundwater flux? How do we specify this with cell types in MODFLOW?