

## Reply to Reviewer #2

- The authors in their response to my earlier comments argue that a Dirichlet BC of the form  $h|_{x \rightarrow \infty} = 0$  is the same as a Neumann BC of the form  $\partial h / \partial x|_{x \rightarrow \infty} = 0$ . They allude to the example of the Theis solution, which can be derived with either of these boundary conditions. However, their argument is not technically correct (or is only half correct). The reason one can obtain the Theis solution from either of these two boundary conditions is due to the behavior of the zero and first order modified Bessel functions of the first kind as  $x \rightarrow \infty$ , both of which approach infinity. The behavior of the Fourier Sine and Cosine transforms, on the other hand, is very different; the cosine and sine function are always bounded in  $[-1, 1]$ . Hence, their use, for the solution to be technically correct, requires that both  $h|_{x \rightarrow \infty} = 0$  and  $\partial h / \partial x|_{x \rightarrow \infty} = 0$  be satisfied, not just one of them. The authors should note this in their development. It will not change their solution because this is already implicit in the definitions of  $S\{\partial^2 h / \partial x^2\}$  and  $C\{\partial^2 h / \partial y^2\}$  that the authors used. What should be noted in the manuscript is that both these conditions have to be satisfied.

Reply: Thanks for the comment. We agree with your point and thus the original remote boundary conditions,  $\lim_{x \rightarrow \infty} \partial h / \partial x = 0$  and  $\lim_{y \rightarrow \pm \infty} \partial h / \partial y = 0$ , in lines 11-12 on page 2351 are replaced by  $\lim_{x \rightarrow \infty} h = 0$  and  $\lim_{y \rightarrow \pm \infty} h = 0$ , respectively. In addition, for indicating both  $\lim_{x \rightarrow \infty} \partial h / \partial x = 0$  and  $\lim_{y \rightarrow \pm \infty} \partial h / \partial y = 0$  are required, we added a sentence in Appendix A (lines 14-15, page 2359) as shown below “Note that the remote boundary conditions,  $\lim_{x_D \rightarrow \infty} \partial h_D / \partial x_D = 0$  and  $\lim_{y_D \rightarrow \pm \infty} \partial h_D / \partial y_D = 0$ , are also required in Fourier sine and Fourier transforms, respectively.” (Note that subscript  $D$  represents the dimensionless expression.)

- Of course you can use the method of image since, after superposition of the responses due to image and real well, you just take the derivative of the head

field at the stream location. This will give you the hydraulic gradient at  $x=0$ , which is all one needs in equation (23).

Reply: Thanks for the comment. We agree that the method of image can generally be used to two-dimensional problems. However, we are not sure whether this method is applicable to three-dimensional problems or not.