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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical Note: Approximate solution of transient drawdown for constant-flux pumping at a partially penetrating well in a radial two-zone confined aquifer" *by* C.-S. Huang et al.

Anonymous Referee #1

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General Comments

C.-S. Huang, S.-Y. Yang, H.-D. Yeh present in the technical note a newly developed approximate solution for the drawdown of a pumping test at a partially penetrating well in a radial two-zone confined aquifer under constant-flux pumping conditions. The analytical solution for steady state and the approximate solution for transient pumping test is something new and interesting to the hydrological community. In general the publication is well-written. The readability could be improved by language check by a

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native speaker and restructuring several subsections, as described later. Figures and tables are in a good shape, minor improvements are suggested later on.

Specific Comments

Abstract
Clarify in the abstract the type of pumping test solution you derive: Is it for homogeneous media (or heterogeneous media)? It is limited to 2D or valid for 3D aquifer description?

Introduction
What are potential applications of the derived approximate solution?

Mathematical Model
Specify the aim of the section at the beginning (p 2745, line 22).

The ordering of the content of the section could be improved: first specify the process of interest (pumping test), including boundary conditions, assumptions and characteristics (e.g. points mentioned in Table 1) first in words, than refer to figure and than in equations.

A table containing the symbols of variables and parameters would improve the readability of the work significantly. Refer to that table in caption of fig. 1 and in the text.

Steady-State Solution
Is the derived solution for steady state already published before? If not, specify that these are new results. If yes give a reference.

Approximate Solution
The ordering of the content of the section could be improved: First state the aim of the approach (why), than the idea of the approach (as given in line 9-11, p 2749), than how it is done (line 20, p 2748 – line 6 p 2749) and than the result (line 17, p 2748). Finally elaborate in more detail on the way how R(t) was found (line 15, p. 2748): how was the trail and error procedure performed, what was the tested range of parameters, to what

HESSD
12, C798–C801, 2015

was the approximated solution compared to and how?

Special Case
Give a link to the relation of the special case solution to previously derived results as given in the introduction. (Similar to the sentence in line 6, p. 2750 for the special case in 2.5.)

Accuracy of approximate Solution
Specify the meaning of the parameters (e.g. line 12, p 2750 state what gamma is, etc.) for easier readability. Give a reason for the choice of parameters, e.g. the point in time t in Figure 2a. Did you test all choices of parameters? What are the ranges of tested parameters? For which choice of parameters did the solutions not match? I recommend to start a new paragraph in line 16, p 2750. The same questions concerning the choice and tested range of parameters as for Fig. 2a apply for Fig. 2b.

Which discrepancies you mean in line 20, p 2750? I do not understand the message of the last sentence, especially what do you mean with " time during which the radius of influence arrives“?

Vertical Flow
Specify the meaning of the parameters (e.g. line 5, p 2751 alpha, etc.) to improve the readability. What is b in line 12, p 2751?

Give a reason for the choice of parameters (line 7, p 2751).

Are the results shown in Fig. 3 representative for other choices of parameters of r, z and gamma?

Concluding remarks
I do not understand what is meant with " during which the time-dependent radius of influence just touches.“ (line 24, p 2751) State in words (not in formulas) what you mean in line 1-4, p 2752. The conclusion should be understandable without searching for the meaning of the parameters.

HESSD
12, C798–C801, 2015

Figures and Tables

Table 1: Avoid the abbreviation CFP in the caption.

Figure 1: Is the abbreviation CFT a typo or was it introduced before? Recommendation of not using abbreviation in caption in general. Variables and parameters used in the Figure are not explained in the caption. This would be OK, if it is given a link to a Table, where they are listed separately.

Figure 2: The different lines in the plots are difficult to distinguish; probably use thicker lines and marker in combination with lines. Give a link to the equation in the text for the "approximate solution".

Figure 3: The different lines in the plots are difficult to distinguish; probably use thicker lines. The color and line scheme appears somewhat arbitrary, this could be improved. List the choice of parameters (as done in caption of Fig. 2).

Technical Corrections

Language could be improvements by native speaker.

The usage of the abbreviation CFP is OK, but I would recommend to avoid it in the abstract and figure/table captions.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 2741, 2015.