

Interactive comment on “Transient drawdown solution for a constant pumping test in finite two-zone confined aquifers” by C.-T. Wang et al.

Anonymous Referee #1

Received and published: 2 December 2011

This paper develops an analytical solution for two-zone confined aquifer of limited radial extent. Yeh et.al. (2003) developed a similar solution but consider domain to be of infinite extent i.e. they consider far-end boundary condition at $r=\infty$ the drawdown $=0$. In current paper authors re-derive the solution of Yeh et.al. (2003) for the case when aquifer is of limited radial extent. This required them changing radial far-end boundary condition to, at $r = R$ the drawdown $= 0$. The mathematical derivation appears to be correct.

Historically, problem of drawdown cone intersecting with a boundary (line boundary or plain in 2D) is addresses through the use of "method of images". However for the case of radial boundary (circular boundary around the pumping well), the method of images

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returns a infinite series of image wells. However, in practice it is hard to imagine a radial boundary situation unless pumping test is conducted on circular "island" surround by water. May be authors would have helped me here in imagining other physical situation by including it in manuscript.

I believe that the authors should give more emphasis to the practical application rather than deriving mathematical solution with some changes in boundary condition of problem. It is clear that the change in boundary condition makes it a new mathematical problem. But one need to emphasize the importance of problem as well. I was happy to see a section on potential application in current manuscript but it has no mention of usefulness of solution.

I recommend authors to re-write their "Introduction" and "Potential application" section specifically mentioning the practical applicability of the solutions that is presented in manuscript. Readers of HEES do not want to read a mathematical solution unless it really addresses a physical issue of importance.

Reference: Yeh HD, Yang SY, Peng HY (2003), A new closed form solution for a radial two-layer drawdown equation for groundwater under constant flux pumping in a finite radius well, *Advances in Water Resource*, 26, 747-757.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 9299, 2011.

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