

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory

Title

Reply to comments by Veling on "A Semi-Analytical Solution for Large-Scale Injection-Induced Pressure Perturbation and Leakage in a Laterally Bounded Aquifer-Aquitard System"

Permalink

<https://escholarship.org/uc/item/88m897zx>

Author

Zhou, Q.

Publication Date

2011-06-01

Peer reviewed

Reply to Comments by Veling on “A Semi-Analytical Solution for Large-Scale Injection-Induced Pressure Perturbation and Leakage in a Laterally Bounded Aquifer-Aquitard System” by Zhou, Birkholzer, and Tsang

Quanlin Zhou *, Jens T. Birkholzer, and Chin-Fu Tsang

Earth Sciences Division, Lawrence Berkeley National Laboratory, University of California,
Berkeley, CA 94720

*Corresponding Author, Tel: 1-510-486-5748, Fax: 1-510-486-5686; Email: qzhou@lbl.gov,
Mail Address: One Cyclotron Road, MS 90-1116

Veling (2010) pointed to “a serious mistake” and “mathematical inconsistency” in Zhou et al. (2009) because the dimensionless flow equations in Equation 4 (in terms of dimensionless hydraulic head rise in the aquifer and the aquitard) would give rise to additional terms when back converting to the groundwater flow equations, in the case that initial conditions for hydraulic head were spatially variable. He added, however, that the conclusions of the paper remain valid when uniform initial conditions are assumed.

We accept this comment because we have indeed assumed uniform initial conditions in the system but failed to state this explicitly in the publication, partially because this assumption is very common in groundwater hydrology when deriving analytical and semi-analytical solutions. The same assumption was employed, for example, by Veling in Veling and Maas (2009), as stated “For the ease of presentation we assume from here on that $\phi_{i0}(r,z) \dots$ are all equal to zero. An arbitrary initial function ... will complicate the solution, but not essentially”. We shall emphasize that with this assumption, our semi-analytical solutions and their derivations are correct.

Acknowledgment

This work was supported by the U.S. Department of Energy and LBNL under Contract No. DE-AC02-05CH11231.

References

Veling, E.J.M. : Comment on ‘A semi-analytical solution for large-scale injection-induced pressure perturbation and leakage in a laterally bounded aquifer-aquitard system’ by Quanlin Zhou, Jens T. Birkholzer and Chin-Fu Tsang, *Transport in Porous Media*, doi 10.1007/s11242-008-9290-0 (2010).

Veling, E.J.M., Maas, C.: Strategy for solving semi-analytically three-dimensional transient flow in a coupled N-layer aquifer system, *J. Eng. Math.* 64(2), 145–161 DOI 10.1007/s10665-008-9256-9 (2009).

Zhou, Q., Birkholzer, J.T., Tsang, C.F.: A semi-analytical solution for large-scale injection-induced pressure perturbation and leakage in a laterally bounded aquifer-aquitard system, *Transport in Porous Media*, 78(1), 127-148 (2009).

DISCLAIMER

This document was prepared as an account of work sponsored by the United States Government. While this document is believed to contain correct information, neither the United States Government nor any agency thereof, nor The Regents of the University of California, nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by its trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or The Regents of the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof or The Regents of the University of California.

Ernest Orlando Lawrence Berkeley National Laboratory is an equal opportunity employer.