Accepted Manuscript

Semi-analytical solutions of groundwater flow in multi-zone (patchy) wedgeshaped aquifers

Nozar Samani, Mohammad M. Sedghi

PII:	S0309-1708(15)00005-6
DOI:	http://dx.doi.org/10.1016/j.advwatres.2015.01.003
Reference:	ADWR 2317
To appear in:	Advances in Water Resources
Received Date:	20 August 2014
Revised Date:	27 November 2014
Accepted Date:	4 January 2015



Please cite this article as: Samani, N., Sedghi, M.M., Semi-analytical solutions of groundwater flow in multi-zone (patchy) wedge-shaped aquifers, *Advances in Water Resources* (2015), doi: http://dx.doi.org/10.1016/j.advwatres. 2015.01.003

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Semi-analytical solutions of groundwater flow in multi-zone (patchy) wedge-shaped aquifers

Nozar Samani^{*} and Mohammad M Sedghi

Department of Earth Sciences, Shiraz University, Shiraz71454, Iran *Corresponding author: <u>samani@susc.ac.ir</u>

Abstract

Alluvial fans are potential sites of potable groundwater in many parts of the world. Characteristics of alluvial fans sediments are changed radially from high energy coarse-grained deposition near the apex to low energy fine-grained deposition downstream so that patchy wedge-shaped aquifers with radial heterogeneity are formed. The hydraulic parameters of the aquifers (e.g. hydraulic conductivity and specific storage) change in the same fashion. Analytical or semi-analytical solutions of the flow in wedge-shaped aquifers are available for homogeneous cases. In this paper we derive semi-analytical solutions of groundwater flow to a well in multizone wedge-shaped aquifers. Solutions are provided for three wedge boundary configurations namely: constant head-constant head wedge, constant head-barrier wedge and barrier-barrier wedge. Derivation involves the use of integral transforms methods. The effect of heterogeneity ratios of zones on the response of the aquifer is examined. The results are presented in form of drawdown and drawdown derivative type curves. Heterogeneity has a significant effect on over all response of the pumped aquifer. Solutions help understanding the behavior of heterogeneous multi-zone aquifers for sustainable development of the groundwater resources in alluvial fans.

Keywords: Radial heterogeneity, Bounded aquifers, Wedge-shaped aquifers, Alluvial fans, Laplace transform, finite Fourier transforms

Nomenclature

d	Aquifer thickness (m)
I _a	Modified Bessel function of first kind and order a
K _a	Modified Bessel function of second kind and order a
I'_a	Derivative of modified Bessel function of first kind and order

а

Download English Version:

https://daneshyari.com/en/article/6380962

Download Persian Version:

https://daneshyari.com/article/6380962

Daneshyari.com