Resolución mediante AQTESOLV

Ejercicio 6 – Práctico 2:

La tabla a continuación muestra los resultados de un ensayo de bombeo de un día en un acuífero cautivo. El caudal extraído fue de 6 m³/min y las medidas se efectuaron en un pozo a 50 m de distancia. El diámetro del pozo de bombeo es de 10".

Determinar los parámetros hidrogeológicos del acuífero. Resolver utilizando Theis y aproximación de Jacob.

Tiempo (min)	Descenso (m)
1	0.05
1.5	0.1
2	0.18
2.5	0.5
3	0.7
4	1.1
5	1.5
6	1.8
7	2
10	2.6
20	3.6
60	5.4
120	6.5
180	7
300	7.9
1000	9.7
2.5 3 4 5 6 7 10 20 60 120 180 300 1000	0.5 0.7 1.1 1.5 1.8 2 2.6 3.6 5.4 6.5 7 7.9 9.7

1 Descarga Versión Demo

- Link: <u>http://www.aqtesolv.com/</u>
- Limitaciones versión Demo:



Download AQTESOLV Demo

» Demo Capabilities

Download a **free** copy of the demo and see for yourself why **AQTESOLV** is by far the <u>best</u> <u>software for aquifer test analysis</u>!

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1. There is **no time limit** on the use of the demo.

 The demo allows you to explore all of the features in AQTESOLV with a few exceptions such as printing results, saving files and groundwater mounding.

2 Ingreso de datos:

1) Nuevo Proyecto / Pumping Test Wizard

Default	ОК
Pumping Lest Wizard Constant-Head Test Wizard Slug Test Wizard	Cancel
Forward Solution Wizard Import AQTESOLV for DOS Wizard	Help
→ Description Helps you create a data set for a single-t numping test and import pressure transd	well or multiwell

2) Seleccionamos:

Test Type	
Choose Type of Pumping	g Test
 Multiwell test (dravovski) observation wells) 	wdown measured in
 Single-well test (d pumped well only) 	rawdown measured in
ОК	Cancel

3) Definimos Unidades de trabajo:

Single Well Test WizardStep 1 (Units)	×
Length and Time Units	
L: m (e.g., drawdown/displacement measurements)	
T: min (e.g., observation and rate measurements)	
Pumping Rate Units	
Q: m³/min for pumping or constant-head tests only)	
Hydraulic Conductivity Units	
K: m/day To report units of m²/day for T (transmissivity), sele units of m/day for K.	ct
< Atrás Siguiente > Cancelar Ayuda	a

4) Información del proyecto:

Sir	ngle Well Test WizardS	Step 2 (Project	Info)		×
	Project Information for A	nnotating Plots	and Reports		
	Company Name: Ej	6	Test We	II Name: P_Bomb	beo
	Client Name:		Obs. We	II Name: P_Obs	
	Project Number:		Date	of Test:	
	Location:			Title:	
					Clear All
-		< Atrás	Siguiente >	Cancelar	Ayuda

5) Información del acuífero:

Aquifer Data	Aquifer Saturated Thickness b: 1 m				
static water level or aquifer top Kv b Kh	Unconfined Aquifers: Measure b from confining unit at aquifer base to the static water level. Confined Aquifers: Measure b from confining unit at aquifer base to confining unit at aquifer top. Hydraulic Conductivity Anisotropy Ratio				
aquifer base	Advanced				

6) Información del Pozo de Bombeo:



r(c): 0.127	m	r(c) = inside radius of well casin
r(eq): 0.127	m	r(eq) = radius of downhole equipment
aquifer	top or static water lev	vel r(p) = inside radius of packer
r(p): 0 — filter pack	m	r(w) = radius of well (open or perforated interval)
- r(w): 0.127	m	r(sk) = outer radius of well skin (disturbed zone enveloping filte
r(sk): 1	m aquifer base	pack)
	aquifer base	

7) Datos de Bombeo

• Importar datos desde archivo txt separado por tabulaciones:

Single Well Test WizardStep 7 (Pumping Rates)	Teimpo-Caudal.txt	×
Per. No. Time (min) Rate (m²/min) Insert Row Delete 1 Add Rows Ccov	Archivo Editar Ver	
Select All Paste	t (min) Q(m3/min)	
Import Search	1	
Pumping Period Data Import Wizard - Step 1 of 3	2.5 6	
Use this wizard to import pumping period data from a text file. File types supported include the following:	4 6	
1. genetic comma and blark demitted ties 2. many types of files with text headers Enter the name of a file to import:	5 6 6 6	
Import file: /ve`vejercicio 6'teimpo-caudal.bt Browse	7 6 10 6	
View Import File	20 6 60 6	
	120 6 180 6	
< Atrás Siguiente > Cancelar Ayuda	300 6 1000 6	

Fer. No.	Time (min)		Insert Now	Delete
7	- 4	8	Add Bows	Conv
	6	6	/idd Howa	copy
9	7	6	Select All	Paste
10	10	6		
11	20	6		
12	60	6	Import	Search
13	120	6		
14	180	6	Filters	Math
15	300	6		
16	1000	6 🔻	·	

8) Información del Pozo de Observación:

Pumping Test WizardStep 8 (OW Data)	×	Pumping Test WizardStep 9 (OW Construction)	×
Well Coordinate System	Well Name P_Observacion Well Coordinates	1 2 3 unit top or water table d z zh unit base Lh unit base Measure depths d, z and zh from unit top or water table (not from land surface).	Well Configuration Vertical, full penetration (1) d: 0 m L: 1 m z: 0 m zh: 0 m Uh: 1 m Unit: Pumped aquifer
< Atrás	Siguiente > Cancelar Ayuda Pumping Test WizardStep 10 (OW Radius) r(e): 0.127 m r(eq): 0.127 m aquifer top or static wa r(p): 0.127 m r(eq): 0.127 m r(eq): 0.127 m aquifer back - r(w): 0.127 m r(ek): 1 aquifer base < Atrás S	<pre></pre> < Atrás Siguier (c) = inside radius of well casing r(eq) = radius of well casing r(eq) = radius of well casing r(eq) = radius of backer (w) = radius of well (open or perforated interval) r(sk) = outer radius of well skin (disturbed zone enveloping filter pack) e Siguiente > Cancelar Ayuda	nte > Cancelar Ayuda

9) Datos de descensos en Pozo de Observación

• Importar datos desde archivo txt separado por tabulaciones:

umping Test WizardStep 11 (OW Observations)			×					
					📃 Pru	ebaBombeol	Ej6.txt	
Obs. No. Time (min) splacement (Weight	Insert	Row	Delete		Archivo	Editor	Vor	
	Add Ro	ows	Сору		Archivo	Ealtar	ver	
	Selec	t All	Paste		+ (min)	Dosconso	(m)	
	Impo	rt .	Search		1	0 05	(11)	
	Filter		Math		15	0.05		
Observation Data Import Wizard - Step 1 of 3			×		2	0.18		
			~		2 5	0.10		
Use this wizard to import	observation	data from a tex	t file.		3	0.7		
File types supported inclu	de the follow	wing:			1	1 1		
1. generic comm 2. many types of	na and blank f transducer	k delimited files files (e.g., In-S	itu)		5	1.5		
Enter the name of a file to	o import:				6	1.8		
		1			7	2		
Import file: ijercicio	6\pruebabo	ombeoej6.txt	Browse		10	2.6		
V	/iew Import F	File			20	3.6		
_					60	5.4		
Append observations	from import	file to data set			120	6.5		
					180	7		
Altria Cimita	ata a l	Canadar	Anuda		300	7.9		
C Auas alguer		Cancelar	Ayuua		1000	9.7		
Pumping	Test Wiz	zardStep	11 (OW Obse	ervations)			×	
Obs	. No.	Time (min)	splacement (Weig 🔺	Insert Row	Delete		
	1	1	0.05		Add Rows	Copy		
	2	1.5	0.1					
	4	25	0.18		Select All	Paste		
	5	3	0.7			1		
	6	4	1.1		Import	Search.		
	7	5	1.5		Filters	Math		
	8	6	1.8					
	9	7	2					
	10							
	10	10	2.6	–				

Siguiente >

Cancelar

Ayuda

< Atrás

10) Finalizar Wizard, ver reporte:

- Se muestra un reporte de los datos ingresados
- Warning: Reporta que el máximo descenso en el pozo de observación en mayor que el espesor saturado (b=1 m) indicado para el acuífero. Se indica que debe corregirse en caso de acuífero NO CONFINADO.

Finish	Angent The Error Log identifies errors detected in your data set. Choose this view when you see the "Check Errors" indicator on the status bar.
Good job! The wizard is complete. Add wells or modify the data set from the Edit menu. Identify appropriate models with diagnostic plots (Radial Row, Linear Row, Bilnear Row, Spherical Row and Derivative) from the View menu. Choose a solution, edit aquifer properties and perform curve matching from the Match menu. Perform visual prior to automatic curve matching to refine starting estimates. Click Finish to continue	Correct The Following Errors Before Proceeding With Analysis WARNING: Maximum displacement > saturated thickness. Correct for unconfined aquifers. Top for Analysing Aquifer Tests with AQTESOLV for Windows 1. Enter Test Data Choose options from the Edit menu to enter or modify test data. 2. Perform Diagnostic Analyses (Optional) Choose diagnostic flow plot and derivative piot options from the View menu. 3. Perform Curve Matching of Prediction Choose the Solution or Toolbox options from the Match menu to perform Gravard solution ana Choose the Automatic, Visual or Toolbox options from the Match menu to perform curve match Obose residual plot and diagnostic report options from View menu to evaluate automatic cur 5. Reporting Choose Form Application from View menu to customize appearance of plots and reports. Choose Finit Preview and Print options from File menu to obtain hardcopy output. Data Set Summary Pumping Test No. of pumping periods (P. Bombeo): 16 No. of ourpring periods (P. Bombeo): 16 No. of ourpring Devision 1
< Atrás Finalizar Cancelar Ayuda	Total no. of observations: 16

3 Interpretación de prueba de bombeo:

- 1) Visualizar los datos:
 - Variable a visualizar: Descenso Tiempo, Caudal Tiempo, etc
 - Ejes: Linear, Log Linear, Log Log

Edit View	Match Tools Window	Help											
e -	Displacement-Time	placement-tim	e •				Ŧ		? \?				
	Composite								•				
	Residual Drawdown	Antra2											
	Agarwal	Cr Aqtws											
	Distance Drawdown		10 -							- 1			
	Residual-Time		10.						Obs. Wells	- '			
	Residual-Simulated							1	P_Observacion				
	Normal Probability							_					
	Discharge-Time							-					
	Derivative-Time		8.	_				_					
	Radial Flow						-	-					
	Linear Flow							-					
	Bilinear Flow					_		-					
	Spherical Flow												
	Diagnostics	Ē	6.	-				-					
	Report	ert		-				1					
	Error Log	E	[]					
	Linear Axes	olac	[]					
~	Log-Linear Axes	lisi	4	_				_					
	Linear-Log Axes	_						-					
	Log Axes							-					
	Format		- 1					-					
	Options							-					
	Zoom		2.					-					
	Refresh			- 0				1					
	Contour							1					
								1					
× .	loolbar												
Ľ.	Status Bar												

2) Seleccionar tipo de solución:

AQTESOLV for Windows - Aqtw3		Solution	×				
File Edit View Match Tools Win	dow Help	Methods					
Automatic Visual	Agtw3	- Available Solutions	Solution Expert				
Toolbox Check Slope	10.	Theis (1935)/Hantush (1961) Reference(s): Theis (1935); Hantush (19	Wellbore skin				
Active Curves Forward Solution	- -	Une source * Wellbore storage: No Wellbore skin: No	Contraction of the second sec				
	8	Partial penetration: Yes Variable rate: Yes Recovery: Yes	Step-drawdown tests Trench Horizontal well Bounded aquifer				
		Type curve solution for a pumping/recovery test in a confined aquifer with variable rate and partial penetration.	Delayed OW response 35 matches found				
	9 9 9	Acepta	Solution is inactive Cancelar Ayuda				

3.1 Ajuste Método Theis:

• Visual (Manual): Sobre la curva de ajuste "clic izquierdo y mantengo presionado". Desplazar la curva y ajustar a los datos observados (curva negra). Utilizar ejes log – log.



 Automático: Seleccionar "Match, Automatic". Luego "Estimate". En la ventana "Automatic Matching" se pueden configurar algunos parámetros del ajuste automático: Criterios de convergencia, Numero de interacciones, rango de puntos a utilizar en el ajuste, etc.



3.2 Ajuste Método Aproximación de Jacob:

• Visual (Manual): Sobre la curva de ajuste "clic izquierdo y mantengo presionado". Desplazar la curva y ajustar a los datos observados (curva negra). Utilizar ejes log – log.





 Automático: Seleccionar "Match, Automatic". Luego "Estimate". En la ventana "Automatic Matching" se pueden configurar algunos parámetros del ajuste automático: Criterios de convergencia, Numero de interacciones, rango de puntos a utilizar en el ajuste, etc. En este caso ajustamos el rango de puntos que queremos utilizar para el ajuste, seleccionando los puntos dentro del intervalo 3 a 300 minutos.

