利用CMG—GEM组分模拟器 模拟煤层气开采教程(二)



加拿大计算机模拟软件集团(CMG)



教程2: 矿场规模CBM模拟

内容:

- (1)利用等温吸附线描述煤层含气量图
- (2) 用户基于含气量输入煤层初始化数值
- (3) CMOST敏感性分析
- (4) CMOST辅助历史拟合

可用数据:

- (1) Rescue格式的地质模型
- (2) 测量不同井的等温线来表示三个主要煤层
- (3) 主要煤层的含气量图

一、打开BUILDER

1.在Launcher中双击BUILDER图标打开BUILDER

2.选择

GEM模拟器,SI国际标准单位,DUALPOR,Gilman and Kazemi形状因子,开始日期 2005-01-01。

3.单击**OK**两次。

二、输入输出控制部分(Input/Output Control Section)

1.在树状图中单击I/O Control。

2.双击Titles And Case ID, 输入"Multi Well CBM model",按OK。

3.双击Restart,选择Enable restart writing,并使用REWIND 2。

三、油藏描述部分(Reservoir Description Section)

1.打开一个RESCUE模型(rescue2009.bin)并导入一个地质网格及油藏属性,如下所示:



ile <u>E</u> dit <u>V</u> iew I <u>O</u> Control <u>R</u> eservoir <u>C</u> o	mponents Rock-Fluid Initial Conditions Numerical Geome	chanics We <u>l</u> l <u>T</u> ools <u>W</u> indow <u>H</u> elp	
<u>C</u> lose Save Ctrl+S Save <u>A</u> s	Plane 1 of 1	₩ ₩ \$ ‡ Q © 0 ₪ 4	
CMOST Save As	· Specify Property	Calculate Validate With Property GEM	
Import from another file	Grid & Spatial Properties from Dataset		
Import from Database	Spatial Properties from Dataset	Multi Well CBM Mode	
Results 3D & Builder Preferences	Spatial Properties from CMG Simulation Results	2	
Create Map File	Spatial Properties from CHEARS Simulation Results		
Open <u>M</u> ap File	Spatial Properties from Stand-alone Arrays		
Select Map to <u>D</u> isplay	RESCUE Model		
Export Contour Map File	Component Properties		
Close Map File	Rock-Fluid Properties		
Scripting	Well Trajectories		
Page Setup			
Print Ctrl+P			
Exit			

2.将CMG关键字与rescue模型属性匹配,如下所示。

Select RESCUE property to import:	Select CMG property to imp	ort to:
Min: 0 Max: 0	Permeability J - Fracture Permeability J - Matrix Permeability K - Fracture Permeability K - Matrix Pinchout Array - Matrix Porosity - Fracture Porosity - Matrix Pressure - Fracture Pressure - Matrix	
Selected List		
Permeability I - Fracture (md) imported to Pe Pinchout Array - Matrix imported to Pinchou NULL Blocks - Matrix imported to NULL Blo NULL Blocks - Fracture imported to NULL I Porosity - Current - Fracture imported to Por Pressure - Fracture imported to Pressure - F	ermeability I - Fracture It Array - Matrix ocks - Matrix Blocks - Fracture osity - Fracture Tracture	
<u>R</u> emove from	n Selected List	
	<u>0</u> K	Dancel

3.当展开 Reservoir 标签下的 Array Properties 时,会有一个红色叉号(^{SSI}),表明在这部 分需要输入一些 "必须的"内容。





4.单击Specify Property按键输入下面的油藏参数和值:

Property	Value for "Whole Grid"
Porosity (Matrix)	0.001
Permeability I (Matrix)	0.001 mD
Permeability J (Matrix)	EQUALSI
Permeability K (Matrix)	EQUALSI
Permeability J (Fracture)	EQUALSI
Permeability K (Fracture)	EQUALSI* 0.1
Fracture Spacing I	0.05 m
Fracture Spacing J	EQUALSI * 0.5
Fracture Spacing K	EQUALSI * 0.1
Implicit Flag	3
Implicit Flag – (Fracture)	3

5.按两次OK进入Calculate Property。

四、组分属性部分(Component Properties Section)

1.在 Components 标签处单击

- ,并选择 Quick CBM Setup。
- 2.对随后出现的对话框单击YES。

3.选择对话框中的CH4单击OK。对随后出现的对话框单击OK,出现新窗口。



4.单击"Advanced CBM modeling"选项。

5.选择如下所示的"User_Input"选项。

Select reservoir initialization option	×
 Select how you want to determine inital conditions in the reservoir. All options are okay for "Quick" method. Use "USER_INPUT scheme. Input inital reservoir pressure, and global composition. Use "VERTICAL "BLOCK_CENTER "COMP scheme. Create at least two initialization regions ("ITYPE): one for FRACTURE and one for MATRIX. Input reference pressure and depth and composition vs. depth table. Use "VERTICAL "BLOCK_CENTER "WATER_GAS scheme. Create at least two initialization regions ("ITYPE): one for FRACTURE and one for MATRIX. Input reference pressure and depth and composition vs. depth table. 	
Use "VERTICAL "DEPTH_AVE "WATER_GAS scheme. Create at least two initialization regions ("ITYPE): one for FRACTURE and one for MATRIX. Input reference pressure and depth and gas composition for each initialization region.	
< <u>B</u> ack <u>N</u> ext > Cancel Help	

6.等温线数据对各种不同煤层都是有效的,多种地域/分区会被用于分配等温线到各层。如下所示选择第二个单选按钮:

Select region type	×
Use "Quick" method. One Langmuir curve for each component for the entire reservoir. Most of the parameters including rock density, matrix porosity, etc. suggested and filled in by Builder	
 Use multiple regions. A region could be a sector, layer, etc. Enter a Langmuir curve for each region for each component. Use constant compressibility (*CPOR and *PRPOR) for all regions. 	
Create/Edit Sectors	
Use multiple regions defined by rock compressibility specified by *CROCKTYPE (Compaction/dilation rocktype). Also may want to enter Palmer and Mansoori parameters. Enter a Langmuir curve for each rock type for each component	
Create/Edit Compaction Regions Set CTYPE Array	
Use multiple relative permeability regions (*RTYPE keyword) and associated rock compressibility (*CROCK). Enter a Langmuir curve for each rock type for each component	
Set RTYPE Array	
< <u>B</u> ack <u>N</u> ext > Cancel	Help

7.单击Create/Edit Sectors.



8.创建三个新分区,分别为:第八层和第九层为"Lower_Coal",第五层和第六层为

"Middle_Coal",第一层、第二层和第三层为"Upper_Coal"。第四层和第七层为无煤层,因此不需要将它们包含到分区内。

注意:该界面只能对层创建分区,但是其他界面可以进行区域分区,并指定不同的等温吸附曲线。 9.给该分区命名。在区域对话框选择中选择必选层并单击 "Add the blocks in the selected region to the sector"。

10.单击Apply完成该分区定义,并继续用类似方法定义其它分区。在三个分区都被定义后单击OK。

11.完成分区定义后单击Next。在接下来的界面为之前步骤中创建好的三个不同分区定义三个不同的等温吸附曲线(注意气体含量输入单位)。煤层气等温吸附曲线参数:输入以下值:

Water Viscosity: 0.62 cp

Water Density: 992 Kg/m3

Ref. press for water density: 101.325 kPa

Reservoir temperature: 45°C

Low	er_Coal	Middle_Coal	Uppper_Coal	
Coal Density(kg/m3)	1435	1435	1327	
Max gas content (cm3/g):	19	18	18.43	
Langmuir pressure:	3850	3750	3800	
Coal diffusion coef .:	3.5E-5	3.5e-5	3.5e-5	
Coal desorption time:	N/A	N/A	N/A	
Initial gas compostion	1	1	1	
Initial gas content:	N/A	N/A	N/A	
Equil. Pres. @ Initial gas co	on.: N/A	N/A	N/A	

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Quick CBM Setup							
Reservoir is initially saturated with wate	er						
Select region Sector: lower_coal	-	Ad	vanced CBM modelli	ng			
If value is NOT entered, use default value	alue if avai	lable				Ρι	ure component Langmuir curves
Description	Default v	/alue	Value			17.0	
Water viscosity (VISW)			0.62 ср				
Water density (DENW)	1000.8 k	.g/m3	992 kg/m3				
Ref. pressure for water density (REFPW)	101.325	kPa	101.325 kPa			13.6	
Coal density (ROCKDEN)	1435 kg.	/m3	1435 kg/m3		6		
Coal compressibility (CPOR)	1.47e-00	17 1/kPa	0.0003 1/kPa		Ĩ	10.2	
Ref. pressure for coal compressibility (101.3 kF	a 🛛	101.3 kPa		Ť		
Initial reservoir pressure (PRES FRAC			Builder will launch		lte		
Depth at which pressure measured (R					8	6.8	<u>├-</u> ╆
Reservoir temperature			45 C		Bas		
Following used for converting g				_		~ .	
- · ·	1					3.4	
Select units for gas content [cm3/g		-					
Enter data for either coal desorption time (or diffusion	coefficient				0.0	
Item	Units	CH4				(0 6,086 12,172 18,258 24,344 30,430
Max. gas content/Langmuir volume co	cm3/g	19					r (kr*a)
Langmuir pressure constant (ADGCST	kPa	3579.99					
Coal diffusion coefficient (COAL-DIF-C	(cm2/s)	3e-005				G	as content vs P, CH4
Coal desorption time (COAL-DIF-TIME	day						
Initial gas composition (ZGLOBALC M		1					
Enter initial gas content, Builde							
Initial gas content	cm3/g					_	
Equil, pressure at initial gas content	kPa						<u>OK</u> <u>C</u> ancel <u>H</u> elp

12.单击两次OK后如下所示设定含水饱和度(未饱和系统):

Set	cons	tant values for spatial prope	rties			×			
Builder will create indicated new spatial properties. Each property will have a constant value for the whole grid. If you do not wish to create a property, uncheck its row. You could also change the value of the newly created property.									
	#	Property	Create prope	New value					
	1	Water Saturation - Matrix, *SW	Image: A state of the state	0.0001					
	2	Water Saturation - Fracture, *	✓	1.0					
			Z Back	Finish	Cancel	Halp			
			<u>к в</u> аск			нер			

13.需要定义油藏基质压力。由于已经选择"user input"初始化,因此该基质及裂缝的网格压力没有被定义。在地质模型中,基于油藏的静水力学梯度我们已经计算出裂缝压力并通过
RESCUE模型导入。基质压力可以通过气体含量图和等温线计算出来。
14.每个煤层都有气体含量图,如: "lower_coal"、middle_coal"及"upper_coal"。.

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15.单击**Specify properties**,在**BUILDER**中导入气体含量图,并将其分配成一个临时属性 "GC_from_map"。

16.分配 "GC map for upper seam. Msh"到第一层至第三层, "GC map for middle seam.msh"到第五至第六层, "GC map for lower seam. Msh"到第八至第九层。第4和7层 为无煤层,因此没有气体含量,如下图所示:

.......

📑 General Prope	erty Specification				
Edit Specification					
	Go To Property: Add New Custom F	Property	Use Region	s / Sectors	
	Block Temperature - Fracture	Block Vol/Area Modifier Ty	CMGCustom Prope	rty	X
UNITS:	С				
SPECIFIED:			Property Name:	CMGLCustom_GC_From M	iap
HAS VALUES:					
Whole Grid			Comments:		
Layer 1 (Lone					
Layer 2 (Lone					
Layer 3 (Lone					
Layer 4 (Lone					
Layer 5 (Lone			1		I
Layer 6 (Lone				UK	Cancel
Layer 7 (Lone			U		
General Property Sp	pecification				

Eale opecification			
	Go To I	Property:	Add New Custom Property Use Regions / Sectors
	Blo	Blo	CMGLCustom_GC From Map
UNITS:	С		
SPECIFIED:			×
HAS VALUES:			
Whole Grid			
Layer 1 (Lone			(D:\COURSE and UPDATED PRESENTATIONS 2009\3 Day Unconventioanl gas training\My Exercise_Abe\Exercise 2\GC map for upper seam.msh)* 1
Layer 2 (Lone			(D:\COURSE and UPDATED PRESENTATIONS 2009\3 Day Unconventioanl gas training\My Exercise_Abe\Exercise 2\GC map for upper seam.msh)*1
Layer 3 (Lone			(D:\COURSE and UPDATED PRESENTATIONS 2009\3 Day Unconventioanl gas training\My Exercise_Abe\Exercise 2\GC map for upper seam.msh)*1
Layer 4 (Lone			0
Layer 5 (Lone			(D:\COURSE and UPDATED PRESENTATIONS 2009\3 Day Unconventioanl gas training\My Exercise_Abe\Exercise 2\GC map for middle seam.msh)*1
Layer 6 (Lone			(D:\COURSE and UPDATED PRESENTATIONS 2009\3 Day UnconventioanI gas training\My Exercise_Abe\Exercise 2\GC map for middle seam.msh)*1
Layer 7 (Lone			0
Layer 8 (Lone			(D:\COURSE and UPDATED PRESENTATIONS 2009\3 Day Unconventioanl gas training\My Exercise_Abe\Exercise 2\GC map for lower seam.msh)* 1
Laver 9 (Lone			(D:\COURSE and UPDATED PRESENTATIONS 2009\3 Day Unconventioan) gas training\My Exercise Abe\Exercise 2\GC map for lower seam msh 1 * 1

17.采用BUILDER中的公式利用气体含量计算基质压力。转到顶部菜单的Tool并选择"Enter Formula...",弹出一个窗口。

18.利用Langmuir参数及气体含量创建如下公式:选择计算对话框中的"Matrix_Pressure"(代替Scheme 1)。

19.单击"Add to list of independent Variables.."并选择如下变量:

X0 = CMGLCustom_GC_from_map

X1= Langmuir Adsorption Constant(CH4)

X2 = Maximal Adsorbed Mass(CH4)

20.利用Calculator创建如下公式;单击OK:

($\rm XO$ / $\rm X1$) / (($\rm X2$ * 82.05 * 288 .15 / 1000) - $\rm XO$)

注意: 以上关系的说明如下:



Calculation Matrix_Pressure		Copy Formula from
Independent Variables		
Variable Name Component Ti	ime	File
X0 CMGLCustom_GC From Map 20	005-01-01	CMGBuilder1
X1 Langmuir Adsorption Const CH4 20	005-01-01	CMGBuilder1
X2 Maximal Adsorbed Mass(U UH4 20	005-01-01	CMGBuilder1
		F
Add to List of Independent Insert Selected into Variables	Edit Selected	Delete Selected
	, 1000)	-20)
J		
7 8 9 / () INT < ==	IF	AND
4 5 6 * e**x In MAX >	THEN	OR
1 2 3 · x ** v log MIN <=	ELSE	
	ELSEIF	
0 +/ + 10**x sqrt ABS >=	ENDIF	
Set a value that Builder should assign to those calculations which may generate math errors, e.g. division by zero, argument <= 0.0 for LOG etc.	You can speci part of data (ra end times)	fy to use only a inge of start and
Assign this value to calculations that may generate math errors:	Chang	e time spec
A tolerance is required for time synchronization with other source properties. A new property will be calculated only if all the source properties can be found at a given time.		
Tolerance 1 day	OK	Cancel

21.分配这些公式到"Pressure",如基质压力利用指定属性特征。

22.Global Composition (CH4)-Fracure,*ZGLOBALC 赋值为 1。除 well & Recurrent,所有部 分都会出现 "green""。

23.由于数据的复杂性,需要输入一些数值调试参数。推荐值如下所示:

DTMAX 30

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DTMIN .0001 NORM PRESS 5000 NORM SATUR 0.05 NORM GMOLAR 0.05 MAXCHANGE PRESS 50000 MAXCHANGE SATUR 0.999 MAXCHANGE GMOLAR 0.999 AIM OFF CONVERGE MAXRES LOOSER NORTH 100 ITERMAX 100 DTWELL 0.1

24.输入如下所示的井轨迹(如果还未通过RESCUE模型输入):从顶部菜单;选择Well > Well Trajectories并单击Well Trajectories...如下图所示:



25.会弹出如下窗口;(步骤1到3);输入必选信息并到步骤3,单击"Finish"完成井轨迹输入。 26.这些井是开采所有层的,因此需要沿着井轨迹射开所有层。所以我们可以利用Builder的 "Quick Perf"选项来沿着井轨迹射孔所有层。

27.如下图所示操作:



28.选择Quick Perf选项射孔 "entire well path" 并单击OK两次。

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	📑 Tra	jectory Perfo	oration In	tervals								
- 9		Read File Save As	for select	ed wells rforations for	uick Perforation Date / Time							
		Quick Perf Calculate	perforatio MD value	n options for es from existin	Simulation start date: 2005-01-01 Perforation date: 2005-01-01							
	•+ ++	Traje * 1 prod1 2 prod1	ctory 1001 1002	Select Da	Use date of the 1-st operating constraint (if production or injection data exist	•						
	* *	3 prod1	003	✓✓	Perforation options Perforation status: Perforated							
		5 prod1	005		Grid size IJK: 23 x 19 x 9. Enter list of layers (like 1, 3, 5:9) Selected grid layers: 1:9	-						
		Select All	Desele	ct All	O Entire well path							

29.下一步导入历史生产数据:从顶部菜单选择**Well > Importing Production/Injection Data...** 此时会出现一个向导,用户需跟着这些步骤来导入生产或注入历史,如下图所示:

Import Production/Injection Data
Step 1: Choose the file containing well production data
For the Generalized File Reading of production, injection, or pressure data:
 The data should be organized into columns, with one type of data in each column. The data can be read in free or fixed format mode. A well name must be one of the columns of data, or the well name is identified by unique text (eg. Well: 03-17, in which case the unique text is Well:).
Please verify that years are 4 digits, since a 2 digit year is not accepted.
Select type of production/injection data file:
General
Name of the file containing the well production/injection data:
Data field type

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Import Production/Injection Data

	1	2		3		4		5				
Identifier	Ignore Column 💌	Date/Tim	ne 🔻	Gas Prod	luced 🔻	Water Produce	d 🔻	Well Mobi	ility-W	/eighted Datum	n Pressu	ure
Related info		MDYlec	ı. O 🔽	Cumulativ	ve valum	e Cumulative vol.						
Units				m3	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m3	-	kPa				
Expected period				Monthly		Monthly						
Missing dates				zeroítake	ze	zeroítake zero						
1	xx	Р		B		0		D	_			
2	Well:	prod1001										
3												
4	**	DATE		Cumulativ	/e	Gas		SC				
5	××	(m3)		(m3)		(kPa)						
6		1/31/200	5	89225.6		1083.33		3513.09				
7		2/28/200	5	173382		1968.41		3397.42				
8		3/31/200	5	284714		2893.03		3327.57				
Э		4/30/200	5	420981		3738.78		3253.12				
10		5/31/200	5	591901		4553.52		3175.02				
11		6/30/200	5	782468		5279.75		3084.34				
12		7/31/200	5	1.00E+06	6	5964.42		2991.57				
13		8/31/200	5	1.23E+06	6	6584.83		2893.97				
14		9/30/200	5	1.46E+06	6	7128.36		2798.3				
1					•							
											_	
ort Production,	/Injection Data				S. II.							
ort Production,	/Injection Data group names and prim	ary constra	ints	Add A	All .				This	table lists the ex	xisting	
ort Production, p 5: Check well/g ector name suffix	/Injection Data group names and prim Water injectors:	ary constra	ints	Add A	All oducers				This well/	table lists the ex group names th ames in the pro	xisting nat do n	ot match
ort Production, p 5: Check well/g ector name suffix	/Injection Data group names and prim Water injectors: Gas injectors:	ary constra	intsA	Add / .dd Only Pr Add Only Ir	All oducers njectors				This well/ the n Selec	table lists the ex group names th ames in the pro	xisting nat do n name b	ot match n file. ny single
ort Production, p 5: Check well/g	/Injection Data group names and prim Water injectors: Gas injectors: Solvent injectors:	ary constra iw ig is	intsA	Add 4 .dd Only Pr Add Only Ir Add Nr	All oducers njectors one	For changing p	orimary) aht click	This well/ the n Selec click	table lists the ex group names th names in the pro ct a well/group and then drag	xisting hat do n oductior name b and dro	ot match n file. ny single p it to ne left if
ort Production, p 5: Check well/g	/ Injection Data group names and prim Water injectors: Gas injectors: Solvent injectors:	ary constra iw ig is	intsA	Add 4 .dd Only Pr Add Only Ir Add No	All oducers njectors one	For changing p constraints, ple	orimary ase ri	, ght click s).	This well/ the n Selec click the N you v	table lists the ex group names th ames in the pro ct a well/group and then drag - lew Name colu want to use it.	xisting hat do n name b and dro mn to th	ot match n file. ny single np it to ne left if
ort Production, p 5: Check well/g actor name suffix	/Injection Data group names and prim Water injectors: Gas injectors: Solvent injectors:	ary constra iw ig is	ints 	Add A dd Only Pr Add Only Ir Add No Add Only M	All oducers njectors one latched	For changing p constraints, ple on the selecter	orimary ase ri d cell(:	y ght click s).	This well/ the n Selec click the N you v	table lists the ex group names th ames in the pro and then drag awn then clau want to use it.	xisting hat do n ductior name b and dro mn to th	ot match n file. ny single np it to ne left if
ort Production, p 5: Check well/g actor name suffix	/Injection Data group names and prim Water injectors: Gas injectors: Solvent injectors: Group 1	ary constra iw ig is Matched	ints New Nam	Add A add Only Pr Add Only Ir Add Only M Add Only M ne	All oducers njectors one latched	For changing p constraints, ple on the selecter	orimary ase ri d cell(s	ght click s).	This well/ the n Selec click the N you v	table lists the ex group names the pro ta well/group and then drag. Iew Name colu want to use it.	xisting hat do n oductior name b and dro mn to th lames	ot match n file. ny single np it to ne left if
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ŧ	Date & Time (day	y)	set STOP	Comments	_	Add a new date:	
2	2007-08-01	(942.00)					
3	2007-09-01	(973.00)				Add a range of dates:	
4	2007-10-01	(1003.00)				Delete selected empty	
5	2007-11-01	(1034.00)				dates:	_
6	2007-12-01	(1064.00)					
7	2008-01-01	(1095.00)					
8	2008-02-01	(1126.00)					
9	2008-03-01	(1155.00)				Delete all empty dates:	
0	2008-04-01	(1186.00)					<u> </u>
1	2008-05-01	(1216.00)					
2	2008-06-01	(1247.00)				To limit output file size, li	imit gi
3	2008-07-01	(1277.00)				output (with WSRF) to:	
4	2008-08-01	(1308.00)				Once every 3 months	
5	2008-09-01	(1339.00)				- Remove existing key	word
6	2008-10-01	(1369.00)				 (WSRF) to limit grid a 	outpul
7	2008-11-01	(1400.00)				Recommendation	ns
8	2008-12-01	(1430.00)					

30.改变第二级操作约束条件为MIN BHP of 500 Kpa。

31.为在results Graph中绘图,我们需要为历史数据创建一个现场历史文件。

五、其他步骤

1.单击树状图中的I/O Control并双击Simulation Results Output。

2.单击 **OUTSRF** 下面的 **Grid** 信息对应的 **Select** 按钮。

MODELUNG GROUP LTD.

第三十一期:利用 CMG—GEM 组分模拟器模拟煤层气开采(二



Cinculs	tion Doculto Fi	e Ulvikie e											
Simula	ation Results Fi	e writing											
Simula	ation result file nan	ne will consist o	of root name of the input file plus .irf extension										
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Frequ	ency or simulation	i nesuits riie w	hung - when to write (wohr)										
	Date/Time	Information	Writing Frequency		Value								
X	Initial	Well	Specified frequency										
	Initial	Grid	Every TIME or DATE keywords (TIME)										
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Items	in Simulation Resu	ults File - What	to write (OUTSRF)										
	Date/Time Information Variables selection												
-12	Date/Time	Information	Variables selection										
X	Initial	Grid	Select grid variables	-C									
	Initial	Reservoir	No variables (NONE)										
1.15													
Write	floating point data	to SR2 file in	DOUBLE precision (SR2PREU).										
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图:模拟结果输出

3.一些默认属性已选。并选择如下属性:

Adsorbed mass fraction of 'CH4' (ADS)

Current porosity (POROS)

Permeability in each direction (PERM)

同时,选择OUTSRF RESERVOIR ALL。

4.单击两次OK转到builder主界面。保存并运行数据。

5.再次利用Palmer and Mansoori参数运算一次生产实例并比较不同。如下在**Reservoir**部分及 **Compaction /Dilation Region**部分输入如下参数, (parameters for P and M): 之后保存数据。

CROCKTYPE 1 CCPOR FRACTURE 3.5E-5 CPRPOR FRACTURE 101.3 POISSR 0.25 YOUNGM 5E6 STRINF 0.005 PRESLN 4700 EXPPM 3 CROCKTYPE 2 CPRPOR MATRIX 101.3 CCPOR MATRIX 3.5E-5 CTYPE FRACTURE CON 1



CTYPE MATRIX CON 2

	Compaction / Dilation		_ 🗆 ×
	Rock Compaction Region: 1		
	C Compaction with single compressibility / reference pressure		
	C Compaction model using tables		
	O Dilation model		
	Palmer and Mansoori Model		
	Parameter (Keyword)	Value	
	Pressure dependence of formation porosity / rock compressibility (CCPOR MATRIX)	3.5E-5 1/kPa	
	Pressure dependence of formation porosity / rock compressibility (CCPOR FRACTURE)	3.5E-5 1/kPa	
	Reference pressure for calculating the effect of rock compressibility (CPRPOR MATRIX)	101.3 kPa	
	Reference pressure for calculating the effect of rock compressibility (CPRPOR FRACTURE)	101.3 kPa	
	Poisson ratio used to calculate ratio of bulk to axial modulus (POISSR)		
	Young's modulus used to calculate pore compressibility (YOUNGM)	5E6 kPa	
	Strain at infinite pressure (STRINF)	0.005	
	Langmuir pressure (PRESLN)	4700 kPa	
	Palmer Mansoori exponent (EXPPM)	3	
L	OK Cancel A	pply H	lelp



Rock Compaction Region: Image: Compaction with single compressibility / reference pressure Compaction model using tables Inreversible compaction behavior Dilation model Image: Component dependent parameters Parameter (Keyword) Component dependent parameters Pressure dependence of formation porosity / rock compressibility (CCPOR MATRIX) 3.5E-5 1/kPa Pressure dependence of formation porosity / rock compressibility (CCPOR MATRIX) 0 1/kPa Reference pressure for calculating the effect of rock compressibility (CPRPOR MATRIX) 101.3 kPa Reference pressure for calculating the effect of rock compressibility (CPRPOR FRACTURE) 101.3 kPa	Rock Compaction Region: 2 Compaction with single compressibility / reference p Irreversibility Compaction model using tables Irreversibility Dilation model Irreversibility Palmer and Mansoori Model Componer Parameter (Keyword) Irreversibility Pressure dependence of formation porosity / rock component Reference pressure for calculating the effect of rock of the pressure for calculating the effect of the pressure for calculating	ressure compaction behavior t dependent paramete	or refis	Value	
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		ompressibility (CPRPO	DR FRACTURE)	101.3 kPa	

六、历史拟合(History Matching)

这个例子证实两种历史拟合的方法:

- 1. Manually: Using experience and judgment.
- 2. CMOST: 需要经验、判断及辅助历史拟合工具。

基础结果(Base Results):















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想要查看历史拟合过程的细节,请参考历史拟合部分的 ppt。