第一期: ECLIPSE 黑油模型转成 CMG-STARS 热采以及化学驱模型 使用教程

1. 安装完 CMG 软件之后, LAUNCHER 中出现一个图标 ECL 100 IMPORT ASSISTANT 2009。双击该图标。出现如下界面。

🛢 DataImporter v2009.1.3	
Name of <u>E</u> clipse File to Be Converted	Browse
	Browse
Convert To Imex	100%
	~
	~
☐ Include <u>n</u> ull keywords ✓ Include <u>c</u> omments keywords	E <u>x</u> it

2. 在 DATAIMPORTER 中,选择需要导入的 Eclipse 模型,以及创建需

要生成的 Imex 文件名。点击 Convert to Imex。

🛢 DataImporter v2009.1.3	
Name of <u>E</u> clipse File to Be Converted	
D:\ecl-imex\11_LHW.DATA	Browse
Name of Imex File to be created	
D:\ecl-imex\imex.dat	Browse
Convert Io Imex	100%
	~
 Include <u>null keywords</u> Include <u>comments keywords</u> 	E <u>x</u> it

3. 完成之后会出现如下界面,提示 Eclipse 中未被发现或未能识别的 关键字。可以点击 Save。之后再查找模型。

B	i Summary of	Keywords no	t tanslated	
	Keyword ENDSCALE MONITOR EQLDIMS REGDIMS COORDSYS RPTRST	Eclipse Se RUNSPEC RUNSPEC RUNSPEC GRID SCHEDULE	Dtion Null/Unkr UNKNOWN UNKNOWN UNKNOWN UNKNOWN UNKNOWN UNKNOWN	
[D:\ecl-imex\imex.txt			Browse
			<u>S</u> ave	<u>E</u> xit

4. Eclipse 模型已经转为 Cmg-Imex 模型,可以查看先前的 Imex 文件已经生成。将 Imex. dat 文件拖曳到 CMG-BUILDER 图标上。出现两个提示框,讲提示内容保存,之后再修正模型。点击 ok,进入 BUILDER。

Builder	
Edit	
Exit Fait CW must be less than or equal to 1e-005 1/kPa. Compressibility (CW) must be less than or equal to 1e-005 1/kPa.	
	DK Save to file
	· · · · · · · · · · · · · · · · · · ·
Builder	
Builder Edit	
Builder Edit >< Range Error at PERMI (NOD): Ranges read 56:58 44:44 544:5 expecting values from 1 to NI=68, NJ=61 and NK=10. File: D:\ecl-imex\imex.dat Line: 22517 >< Error reading property PERMI. (File: D:\ecl-imex\imex.dat Line: 22517). All specifications of this property, including refinements will be ignored. Please save the dataset under a different file name.	
Builder Edit >< Range Error at PERMI (MOD): Ranges read 56:58 44:44 544:5 expecting values from 1 to NI=68, NJ=61 and NK=10.	
Duilder Edit >< Range Error at PERMI (MOD): Ranges read 56:58 44:44 544:5 expecting values from 1 to NI=68, NJ=61 and NK=10.	
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Builder Edit >< Range Error at PERMI (MOD): Ranges read 56:58 44:44 544:5 expecting values from 1 to NI=68, NJ=61 and NK=10.	

OK Save to file...



5. 根据导入时的提示内容,以及 BUILDER 的 Validate 功能,对模型 中出现警告的部分进行修正。Reservoir 部分,PERMI(即 I 方向上 的渗透率)在导入的过程中出现错误。请参考 step 3 中出现的提 示,显示为 K 方向上的层数错误。将 544:5 修改为 5:5。此外添 加岩石压缩系数以及水的压缩系数。

🗄 🖌 NULL Blocks, *NULL Net Pay, *NETPAY 🗄 🖌 Net to Gross Ratio, *NETGROSS Non Equilibrium Oil Saturation, *SONEQ Non Equilibrium Water Saturation, *SWNE Oil Saturation, *SO Oil-Gas Surface Tension, *SRFTNG PVT Type, *PTYPE 🖃 🔀 Permeability I, *PERMI Property is required. 표 🖌 Permeability J, *PERMJ 표 🖌 Permeability K, *PERMK 🖌 Pinchout Array, *PINCHOUTARRAY 🗄 🖌 Porosity, *POR Pressure, *PRES 🖌 Rel Perm Set Num, *RTYPE Rock Compaction Set Num, *CTYPE Sector Number for Grid Block, *ISECTOR Solvent Sat Pressure, *PBS

Rock Compressibility	×
Pressure dependence of formation porosity / Rock Compressibility (CPOR)	
1e-4 1 <i>I</i> kPa	
Reference pressure for calculating the effect of rock compressibility (PRPOR)	
101.3 kPa	
OK Cancel	

6.最终生成 Imex.dat 文件。之后需要将 Imex 模型转成 CMG-STARS 模型。点击 File-Convert Simulator Type For Dataset-To Stars.
出现界面,点击 Yes。

7.选择生成的Stars文件名。在Fluid model import/conversion 下 方选择 Convert From Blackoil model。点击 ok。

Convert simu	lator type	
Target simulator:	STARS	
Target file name:	D:\ecl-imex\imex2stars.dat	
Fluid model impor	t/conversion	
🔘 Will enter late	r	
Convert from	Blackoil model	
🔵 Import from V	VinProp generated file	Launch WinProp to create model
Source		
	<u>O</u> K	Cancel Help

8. 点击 ok。之后出现输入油藏温度的对话框,输入 60℃。

Enter value		
Enter reservoir te	emperature:	
60		
	<u> </u>	<u>C</u> ancel

点击 ok。

9. 选择 Select From Table 获得 Bubble Point Pressure。对 Black

0il PVT 进行拟合。

Stars Import Black Oil PVI				\mathbf{X}
This black oil PVT import wizard will create a new fluid r read from a file, or 2) generated from analytical PVT cor If the PVT data is read from a file, it can be edited using	nodel for relations the black	r STARS. Black oil PV1 s using the black oil PV1 k oil PVT GUI.	F can be input using 2 methods: 1 T graphical user interface (GUI).	1)
D: Vecl-imexNimexaa-final.dat				
Read Black Oil PVT	Data in IN	MEX Format	Black Oil PVT Properties	a
Launch the Black Oil PVT G	raphical I	User Interface(GUI)		_
VArite Black Oil P	VT Data	to a File	Temperature 60 C	
<u></u>	11 Data	Select PVT table		
Oil Density Options • Use Do=(DeadOilDensity + GOR*GasDensity)/Bo • Input live oil density in the table on the right Input gas gravity in the table on the right and calculate oil density using the equation above. Explain Density Input Bubble Point Pressure To enable the Next button, a bubble point pressure must be input that is identical to one of the pressure points in the black oil PVT table 26000.000000 kPa	1 2 3 4 5 6 7 7 8 9 10 11 12 13 14	Pressure, kPa 100.00000 2000.00000 4000.00000 6000.000000 8000.000000 1000.000000 1000.000000 10000.000000 12000.000000 16000.000000 16000.000000 20000.000000 22000.000000 24000.000000 26000.000000 26000.000000		
Re-Match		< <u>B</u> ack	Next > Cancel	



完成,点击Finish。

10. 检查 STARS 模型,给定 DTWELL,赋值 0.01。如果为化学驱模型, 需要将 Isothermal 设定为 on,这样在整个模拟的过程并没有热能 的交换,可以提高运行速度。

- Mumerical				
1996-12-01				
Keyword Description	Default Value	Dataset Value	Set At Time	~
Timestep Control Keywords				
Maximum Number of Timesteps (MAXSTEPS)	9999			
Maximum Time Step Size (DTMAX)	1e+020 day			
Minimum Time Step Size (DTMIN)	1e-008 day			-
First Time Step Size after Well Change (DTWELL)		0.01		
Normal Variation per Time Step (NORM)				
Pressure (PRESS)	500 kPa			
Saturation (SATUR)	0.2			
Temperature (TEMP)	30 C			
Gas Mole Fraction (Y)	0.2			
Oil Mole Fraction (X)	0.2			
Water Mole Fraction (W)	0.2			
Oleic Component Global Mole Fraction (ZO)	0.2			
Noncondensible Gas Global Mole Fraction (ZNCG)	0.2			
Aqueous Component Global Mole Fraction (ZAQ)	0.2			
Fluid Enthalpy (FLUIDH)	2500 J/gmole			~
Comments for DDAEL				
	<u></u> K	<u>Cancel</u>	Apply Help	

Keyword Description	Default Value	Dataset Value	Set At T	ime 🔥
Noncondensible Gas Global Mole Fraction (ZNCG)	0.2			
Aqueous Component Global Mole Fraction (ZAQ)	0.2			
Fluid Enthalpy (FLUIDH)				
Solution Nethod Keywords				
Isothermal Option (ISOTHERMAL)	OFF	ON	_	
Model Formulation (TFORM)	SXY	ZT		
Under-Relaxation Option (UNRELAX)	-1			
Upstream Calculation Option (UPSTREAM)	NLEVEL			
Maximum Newton Iterations (NEWTONCYC)	15			
Maximum Time Step Cuts (NCUTS)	7			
Maximum Pressure Limit (MAXPRES)	1e+006 kPa			
Minimum Pressure Limit (MINPRES)	50 kPa			
Minimum Temperature Limit (MINTEMP)	1 C			
Maximum Temperature Limit (MAXTEMP)	2000 C			
Maximum Phase Switches per Time Step (PVTOSCMAX)	60			
Adaptive Implicit Method (AIM)	OFF			~
omments for ISOTHERMAL				
comments for ISOTHERMAL				

11. 在 Wells&Recurrent 部分,讲注入井的注入组分设定为 Water 1.

并采用 Builder 的 copy 功能给其他井进行相同设置。

Vell Even t	s							X
displayed w	vells 29 of 29	2000-06-30	~	Tell:	'85501_ij' a	at 2000-06-30	(1307.00 day)	
Name / Date	Event 🔼	TD & Type						1
85501_jj			Injected fluid:	WATER			~	
2000-06-30	WELL	Constraints			c .			-
	constraints	Multipliers		#	Lomponent Water	Mole Fraction	Normalize	
2000-07-27	XFLOW-MODEL INJECTOR	Wellbore		2	Dead_Oil	0.		
	constraints 🦳 💻	Injected Flui		3	Soln_Gas	0.		
2000-07-30	injected fluid INJECTOR	Options			Total:	1.		
2000-08-26	injected fluid	Layer Gradient						
	constraints injected fluid	Gas Lift						
2000-09-01	INJECTOR constraints	Guide Rates						
2000-12-01	injected fluid INJECTOR	Comments	~Inj	ection flu	id / stream attributes —			
	constraints injected fluid			📃 Temp	erature	0 C		
2001-03-01	INJECTOR constraints			Stear	n quality	0		
2001-06-01	injected fluid INJECTOR constraints injected fluid	-12		Press	ure	0 kPa		
Sort by: 💿 Name O Date	Tools 🕨		Reset Page	Auto-app		Cancel Ar	pply <u>H</u> elp	

12. 模型完成。将 imex2stars. dat 拖曳到 STARS 图标中进行计算。

🛃 Builder - [imex2stars.dat:1]		_ = X
Eile Edit View IO Control Reservoir Components	Rock-Fluid Initial Conditions Numerical Geomechanics Well Tools Window Help	_ # ×
i D は 🖬 🐰 🖻 🖻 い 🎒 👌 🗧 🖊 🔀 🛛	🖌 Full Window 🕤 🗃 📴 😁 🖕 🐺 😓 🖾 拱 基 💠 💠 🔍 🐑 😈 🗠 🖼 英 😓 🥫	
		×
3D View V Plane	1 of 1 Country Colorado Validada Validada Validada Validada Validada Validada Validada Validada Validada Validad	
Contour Fill V Rel Perm Set Num	Validate Val	
Bodel Tree View - 4 ×		200 B
V I/O Control		Lect
🔥 Reservoir 🔸		8
V Components		8
V Rock-Fluid		Proj
V Initial Conditions		erti
V Numerical		â
Geomechanics		DE O
Vells & Recurrent		11:
✓ Titles And Case ID ✓ Run Time Dimensioning		6
V Restart		et.
V Text Output		ti es
Miscellaneous		
ļ.	Bendering 41480 grid blocks, 41480 wiew blocks, 10676 exterior faces	🔁 中 🤳 🦏 🥅 🛎 🗡