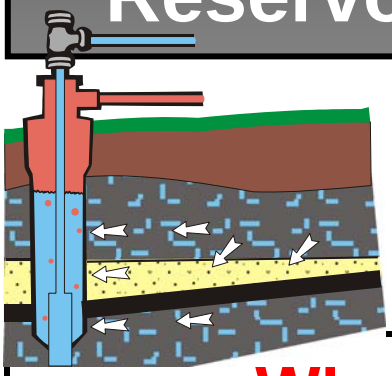
EXODUS - Coal Bed Methane Reservoir Modeling (CBM & ECBM)



Accurate, flexible calculations to help you make informed decisions, optimize budgets and maximize your profits.

Why *YOU* should use EXODUS:

- ✓ 3D, 3-phase, multi-component reservoir simulator
- ✓ Existing installed base - proven over last 15+ years to be numerically stable and accurate.
- ✓ History matching of measured data a routine procedure.
- ✓ Built-in NPV economic comparison capability.

- ✓ User friendly pre & post processors for ease of data entry and results analysis.

- ✓ Flexible reservoir description.
  - Multilayers of sand, shale, coal sequences.
  - Faults, pinchouts.
  - Aquifers.
  - Local grid refinement.

We let *YOU* get it right.

- ✓ Grid systems – handles large number of cells.
  - Single porosity (fast gas diffusion).
  - Dual porosity / permeability (slow gas diffusion).
    (matrix and cleats independently modeled with user controlled inter-porosity flow).
  - Triple domain systems possible … if you must and you have data.
  - Hydraulic fracture of individual wells.

- ✓ Enhanced Langmuir Isotherm for multiple component adsorption (Methane, CO_2, N_2)
- ✓ Pressure dependent porosity and permeability handling to accommodate coal shrinkage effects – with rebound.
- ✓ Many well modeling options (vertical, deviated, horizontal).
- ✓ Surface network gas gathering system with compressors etc.

- ✓ Quick and simple or detailed and rigorous – the choice is ***YOURS***!

Dry Gas Surface Network modeling is now included.

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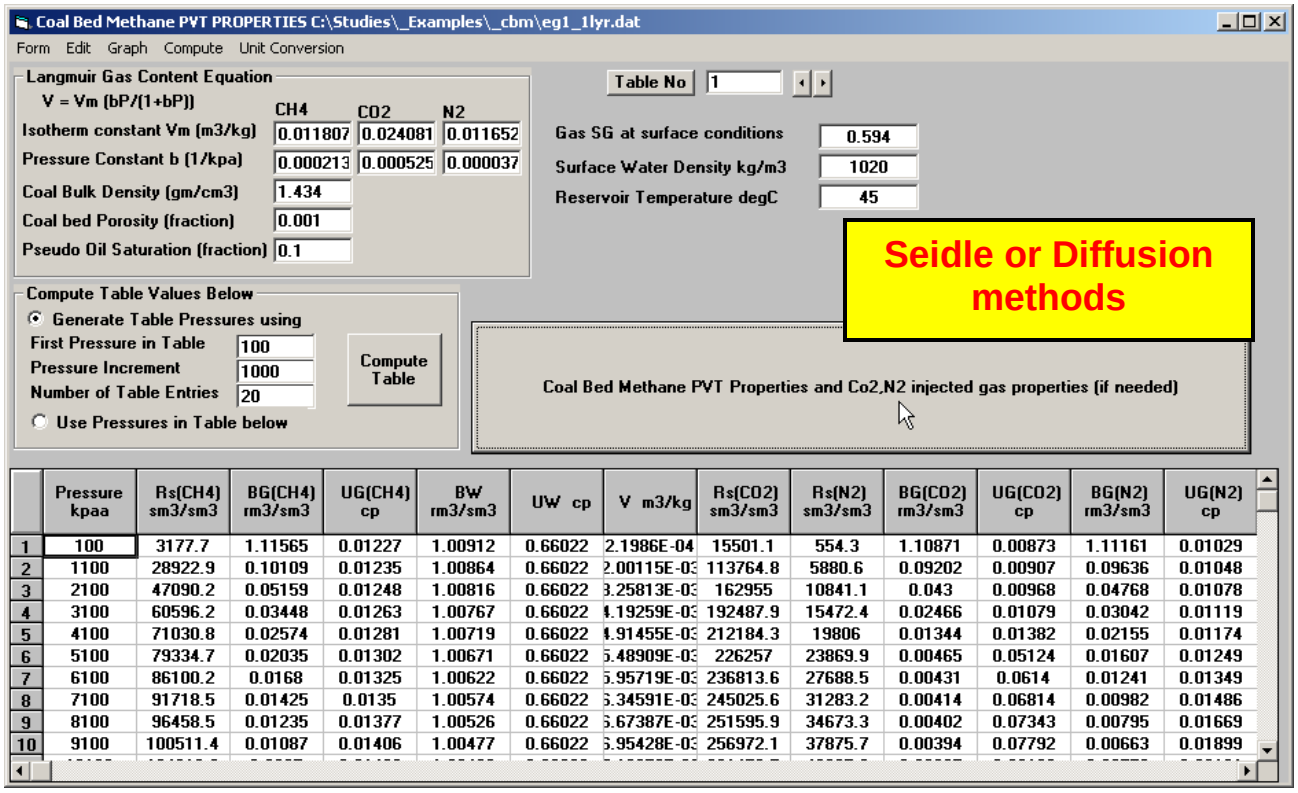
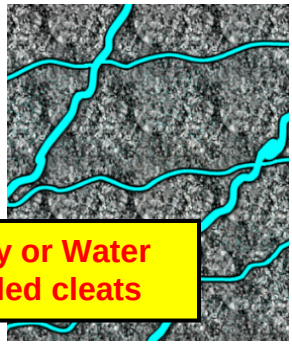
Reasons to use EXODUS:



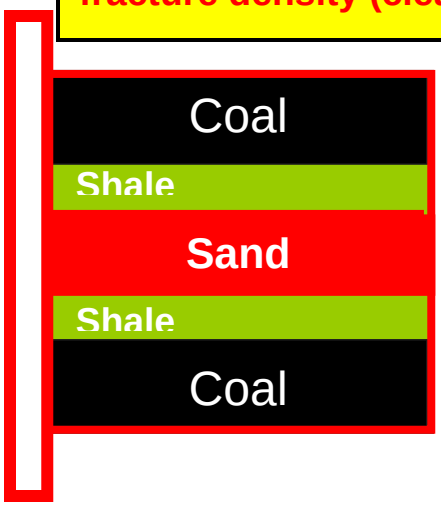
	Pressure kpaa	Rs(CH4) sm3/sm3	BG(CH4) rm3/sm3	UG(CH4) cp	BW rm3/sm3	UW cp	V m3/kg	Rs(CO2) sm3/sm3	Rs(N2) sm3/sm3	BG(CO2) rm3/sm3	UG(CO2) cp	BG(N2) rm3/sm3	UG(N2) cp
1	100	3177.7	1.11565	0.01227	1.00912	0.66022	2.1986E-04	15501.1	554.3	1.10871	0.00873	1.11161	0.01029
2	1100	28922.9	0.10109	0.01235	1.00864	0.66022	2.00115E-03	113764.8	5880.6	0.09202	0.00907	0.09636	0.01048
3	2100	47090.2	0.05159	0.01248	1.00816	0.66022	3.25813E-03	162955	10841.1	0.043	0.00968	0.04768	0.01078
4	3100	60596.2	0.03448	0.01263	1.00767	0.66022	4.19259E-03	192487.9	15472.4	0.02466	0.01079	0.03042	0.01119
5	4100	71030.8	0.02574	0.01281	1.00719	0.66022	4.91455E-03	212184.3	19806	0.01344	0.01382	0.02155	0.01174
6	5100	79334.7	0.02035	0.01302	1.00671	0.66022	5.48909E-03	226257	23869.9	0.00465	0.05124	0.01607	0.01249
7	6100	86100.2	0.0168	0.01325	1.00622	0.66022	5.95719E-03	236813.6	27688.5	0.00431	0.0614	0.01241	0.01349
8	7100	91718.5	0.01425	0.0135	1.00574	0.66022	6.34591E-03	245025.6	31283.2	0.00414	0.06814	0.00982	0.01486
9	8100	96458.5	0.01235	0.01377	1.00526	0.66022	6.67387E-03	251595.9	34673.3	0.00402	0.07343	0.00795	0.01669
10	9100	100511.4	0.01087	0.01406	1.00477	0.66022	6.95428E-03	256972.1	37875.7	0.00394	0.07792	0.00663	0.01899

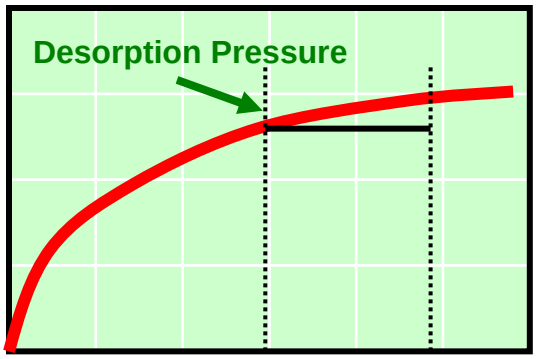
- **Radial or Cartesian coordinates**
- **Stress and/or Pressure dependant properties**

User selected regions allow multiple coal definitions and/or the influence of variable fracture density (cleat spacing) etc.



Dry or Water filled cleats





... and much more!

In addition to CBM, Exodus also models conventional reservoirs with Black Oil, Condensate, K-Value Compositional n-Components etc.