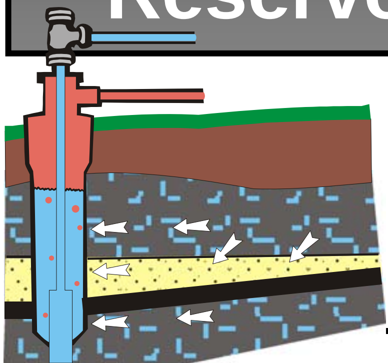
# EXODUS - Coal Bed Methane Reservoir Modeling (CBM & ECBM)



*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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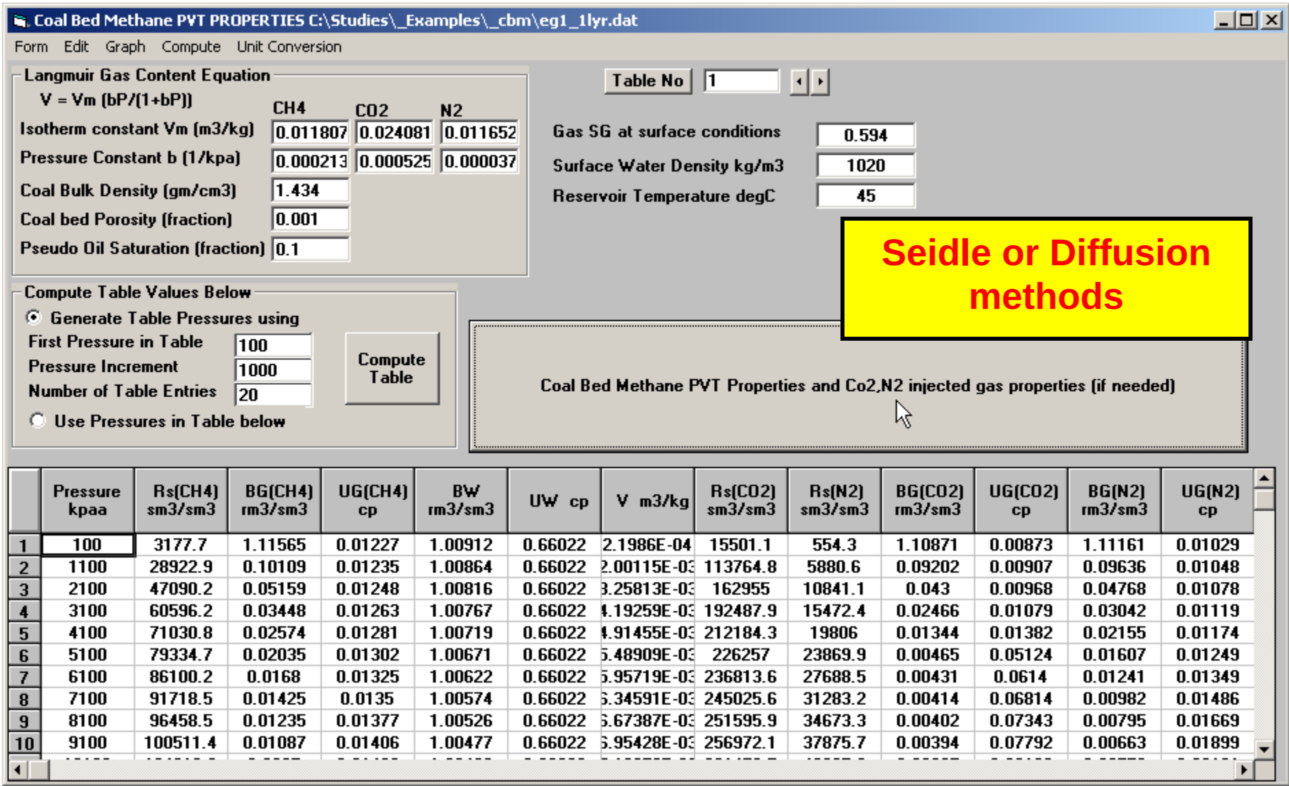
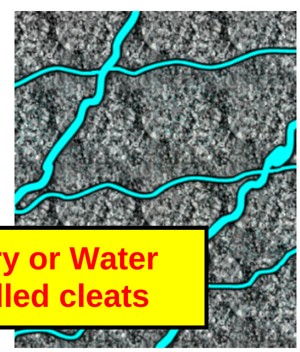
# Reasons to use EXODUS:




| | 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 |

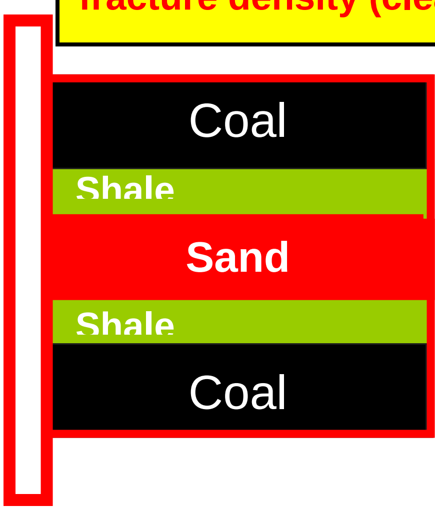
**Seidle or Diffusion methods**

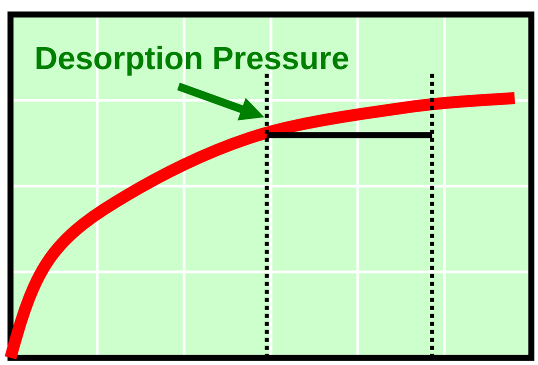
- **Radial or Cartesian coordinates**
- **Stress and/or Pressure dependant properties**



**Dry or Water filled cleats**

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




**… and much more!**

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