THREE-PHASE, BLACK-OIL RESERVOIR SIMULATOR

APPLICATIONS

CONVENTIONAL & NATURALLY FRACTURED RESERVOIRS
- Natural Depletion
- Solution drive
- Water drive
- Compaction drive
- Gravity drainage
- Gas-oil drainage
- Enhanced Oil Recovery
- Waterflooding
- Polymer flooding
- Dry gas injection
- Pseudo-miscible gas injection

UNCONVENTIONAL RESERVOIRS
- Tight oil/gas reservoirs
- Explicit modelling of hydraulically fractured wells
- Non-Darcy flow
- Pressure & time-dependent compaction
- Microseismic data import for better hydraulic fracture characterization (version 2015)

GAS STORAGE PROJECTS
- Abandoned gas fields
- Aquifers

FULLY COUPLED MODELS
- Hydraulic tables to model branched surface networks
- Third-party surface network simulators to model looped surface networks
  - GAP, FORGAS, Avocet IAM, METTE

NATURALLY OR HYDRAULICALLY FRACTURED RESERVOIRS
- Hydraulically fractured wells with non-Darcy flow
  - Single planar
  - Complex
- Multiple naturally fractured models
  - Dual Porosity, Dual Permeability, Sub-domain, Multiple Interacting Continua (MINC)
- Import simulated fracture data created by GOHFER (version 2015)
- Create fractures based on microseismic data
- Fracture clean-up model
- Seawater/scale build-up option
- Permeability vs. pressure relationship
- Rock compaction table reassignment in recurrent data

FEATURES

MULTIPLE PVT REGIONS
- PVT fluid models
  - Seawater, polymer, pseudo-miscible solvent, black or volatile oil, gas condensate, API tracking
- Multiple solvent PVT tables
  - Extended oil-solvent mixing parameter table
  - Oil saturation threshold for solvent mixing
  - Shear-rate dependent polymer viscosity
  - Saturated & under-saturated oil & gas properties
  - Variable bubble point & dew point pressure formulation
- Limit maximum rate of gas dissolution in oil phase and oil increase in gas phase
- Model gas adsorption effects in shale gas and CBM reservoirs
- Reservoir pressure vs. depth tables for initialization regions

BENEFITS
- Achieve simulation results faster than any other black oil simulator
- Ability to quickly screen a variety of recovery mechanisms before moving to more complex simulations
- Accurate modelling of the matrix-fracture transfer in fractured reservoirs
- Use the speed of IMEX to model shale gas adsorption effects
- Fast and easy transition to EOR process modelling in GEM™ and STARS™
- Seamlessly interfaces with CMOST™ to facilitate rapid history matching and optimization of reservoir management workflows
FEATURES (CONTINUED)

RELATIVE PERMEABILITY MODEL
- Relative permeability with hysteresis
- Capillary pressure with hysteresis
- Water-wet, oil-wet & mixed-wet options
- Three-phase relative permeability formulations (Stone 1, Stone 2, Segregated, Linear-Isoperm)
- Non-Darcy flow

PSEUDO-MISCIBLE & POLYMER PROCESSES
- Pseudo-miscible fluid injection
  - Solvent solubility in water, chase gas injection
  - First contact miscible (Todd and Longstaff)
- Polymer injection
  - Aqueous phase viscosity increase
  - Polymer adsorption and dispersion
  - Absolute and relative permeability reductions

WELLS & RECURRENT DATA
- Accurate representation of well trajectories for deviated & horizontal wells
- Head & friction pressure loss in horizontal & multi-lateral wells
- Triggers – condition-dependent operation of wells
- Group cyclic controls
- Voidage replacement by well-group
- Cumulative transmissibility multiplier
- Output of Well Productivity Index (WPI) based on flexible estimates of drainage pressure
- Well head pressure stability constraint (version 2015)
- Specify range of acceptable well indices values (version 2015)

SURFACE NETWORK MODELLING
- Seamless integration with surface network modelling software (FORGAS† and GAP†)
- Single or multiple reservoirs
- Time-step level coupling
- Field development scheduling controls and constraints
- Multi-phase flow in both the gathering system and wellbore
- Semi-implicit inflow performance relationship calculation

CMG simulators have a base set of common modules to ensure compatibility, speed and quality of output consistent

GRID PROCESSING
- Local grid refinement (LGR)
- Cartesian
- Cylindrical
- Fully non-orthogonal corner point grids
- Transmissibility multipliers
- Corner-point to node-based grid conversion

ADAPTIVE IMPLICIT FORMULATION
- Run-Time Dimensioning
- Intelligent stability switching criterion
- Numerical stability

WELL MANAGEMENT
- Control well production and injection at the field, group, platform, and well levels
- Voidage replacement
- Gas lift optimization
- Gas recycling
- Calculation of well index for directional wells
- History-matching mode for treatment of observed surface phase rates

PARALLEL PROCESSING
- Intelligent well and grid domain partitioning for optimum parallel performance scalability

SEAMLESS INTEGRATION WITH CMOST
- History matching
- Sensitivity analysis
- Optimization
- Uncertainty analysis

64-BIT WINDOWS AND LINUX
- Operating environments and performance standardized for 64-bit compatibility for Windows®, Linux®, Intel® and IBM®

FOR MORE INFORMATION PLEASE CONTACT marketing@cmgl.ca