METTE

Flow Assurance and Optimization from Exploration to Daily Production

### Benefit from Advanced Technology in One Intuitive Platform

METTE™ is an integrated flow assurance and production modeling software solution that provides flow performance calculations for wells and flow lines, and integrated field modeling for life-of-field simulation and optimization. It enables virtual metering for allocation of production to wells, and transient flow simulation for dynamic analysis of wells and flow lines. By combining data from predictive reservoir models, production modeling and field instrumentation, operators can continuously monitor production and use field information when forecasting reservoir performance and making operational decisions. Input data can be integrated from databases and connected to both proxy reservoir models and reservoir simulators to model flow behavior from the reservoir to the surface.

METTE is designed to get the most out of the reservoir lifecycle. It supports reservoir and production engineers, production technologists, and facilities staff by providing access to all types of thermo-hydraulic calculations within the framework of a single application.

Flow Performance

The steady state flow performance module allows single well or flow line performance of mono and multiphase flow systems. Users may apply different boundary conditions to evaluate and diagnose the performance of wells with or without artificial lift.

The user interface supports simple setup of data and definition of calculation conditions. Multipliers can be applied to key parameters such as diameter, heat transfer coefficients, and phase densities for simple screening of parameter sensitivities. Likewise, settings can be made for different items, such as valve positions for chokes, power/frequency for pumps, or gas lift amounts for mass source items.
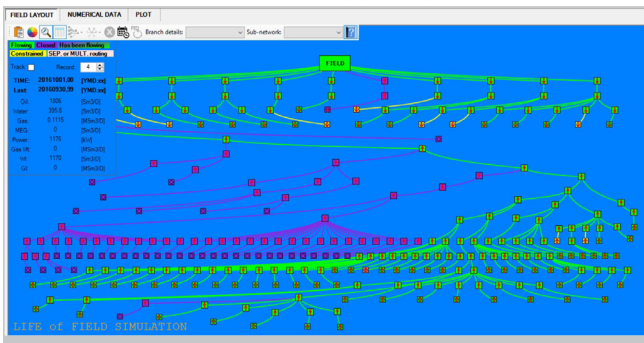
▲ A network diagram in METTE showing flowing wells and flow lines in green as the simulation is running.

Integrated Field Modeling

Integrated production modeling is used to evaluate the total production system consisting of multiple reservoirs, wells and flow lines. Users can model production networks from reservoir to topside, including service networks for hydrate inhibitors or gas-lift injection. Unit operations such as choking, pumping, compression and simple separation are modeled during simulation, with databases, proxy reservoir models and/or reservoir simulators being used as input data sources. By modeling the mass and energy balances from the poreous media and all the way to the terminal delivery point, engineers can evaluate different production scenarios and help identify the most cost effective solutions for new fields or tie-ins to existing fields.

The module is seamlessly integrated with multiple reservoir simulations within a single network simulation. The novel network solver is proven with large and complex models, and the low simulation time adds little overhead for integrated asset modeling. For both green and brown fields, METTE helps operators efficiently develop, evaluate and optimize production.
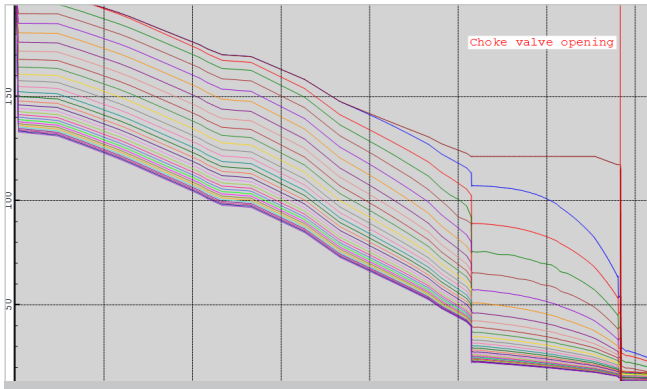
Transient Flow

The transient module is used for the time dependent simulation of well and flow line behavior. It provides a focused and speedy alternative to available simulators in the market for dynamic multiphase simulations.

Typical applications include:

- Cool-down times for different pipe wall insulation configurations
- Calculating necessary hydrate inhibitor amounts during cold start-ups and time to reach steady production
- Evaluation of requested times for flow line depressurization with flare rates and volumes produced to sump
- Determining the effect of inadvertent events like accidental valve openings or choke collapses
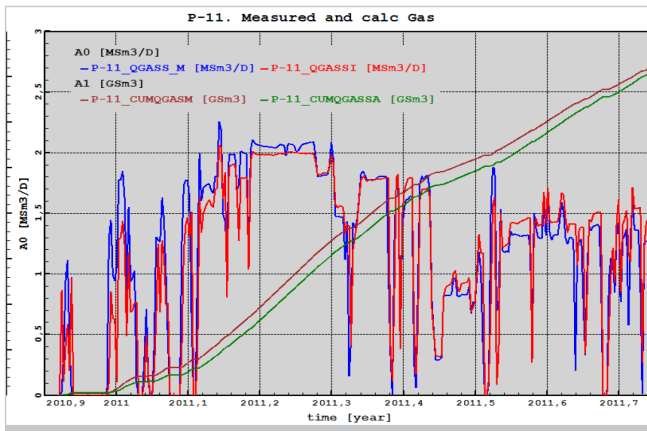
METTE

Initial conditions and time-dependent variations in boundary conditions, and other calculation parameters are defined using the same METTE interface as for steady state calculations.

▲ A transient well start-up simulation from cold conditions showing pressure profiles along the well.

Virtual Metering

Virtual metering is a very cost-effective solution for finding well phase flows. From production data in Excel, METTE can back-allocate production rates based on historical data from sensor measurements and equipment from producing fields. The METTE calculation engine can connect to OPC DA servers to run near-real-time virtual flow metering. This is the engine for the Emerson Virtual Metering System, which focuses on production monitoring in live producing fields.

▲ Virtual flow metering is applied to a gas producing well (P-11) comparing reference gasrate in blue with estimated gasrate from METTE in red.

METTE Features

- An integrated suite of tools for all flow modeling tasks
- Seamless integration with reservoir simulators
- Simulation input creation, editing and run submission
- Result plotting and 2D visualization
- Pre-defined graphics reports
- Tools for model calibration and data validation
- Run multiple scenarios to screen parametric sensitivities

The Advantages of METTE

- The combination of time-dependent and steady-state flow modeling provides a comprehensive approach to your system
- Excellent and proven performance on both calculation speed and large system handling capacity
- Optimal delivery under any condition through efficient design and safe operation
- Simple connection to reservoir simulators for integrated asset modeling – modeling flow from the subsurface to surface facilities - facilitates critical, cost-effective decisions
- Minimal downtime by effective response to events that impact flow, from reservoir to topside

Interoperability

- Tempest MORE
- Tempest VIEW
- Eclipse*
- Petrel* Well Trace File

(*is a mark of Schlumberger)

System specifications

- 64-bit, for x64 architecture processors
- Microsoft® Windows® 10
- Red Hat® Enterprise Linux® 7 (RHEL 7.6). Calculation engine only.

www.emerson.com/epsoftware