Reservoir Simulation Suite

Build
Analyse
Control
Sim

S3
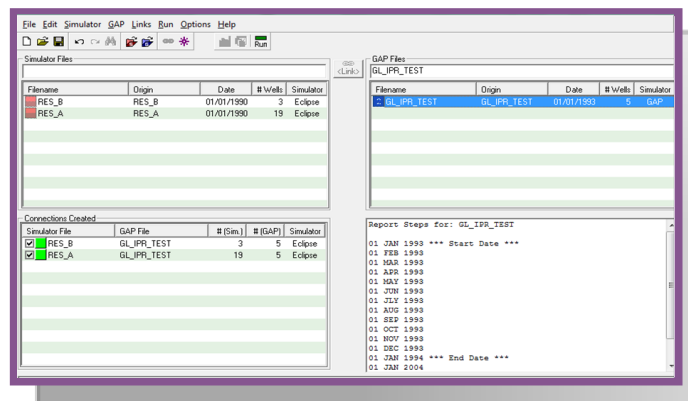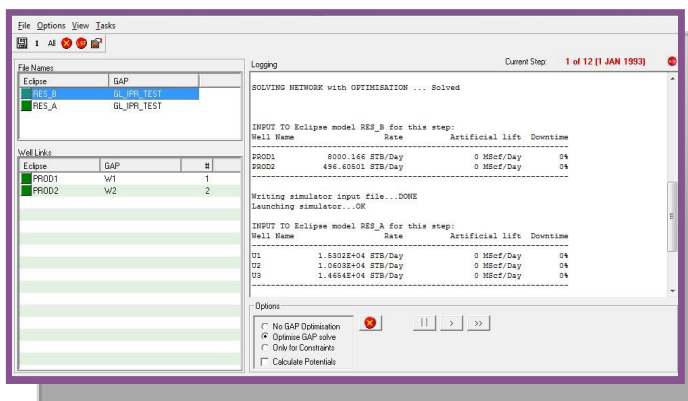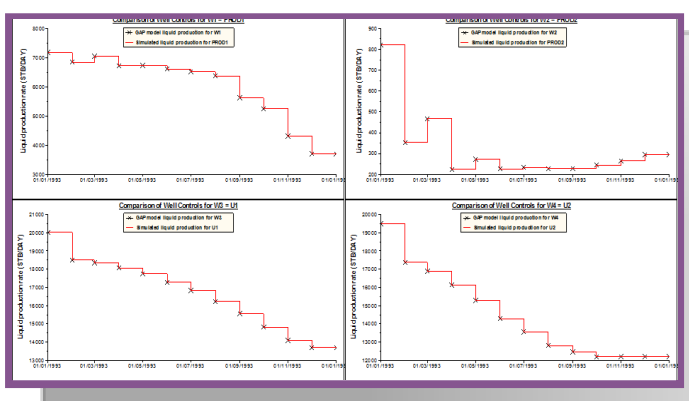
Sciencesoft ®

S3*connect*

Striking the right balance

- *Full bi-directional coupling between surface network and sub-surface*

- *Accurate heterogeneous reservoir model input to surface network*

- *Improved reservoir simulation with realistic surface constraints*

- *Efficient use of simulator licences*

- *Couples to multiple simulators*

CONTROL

Striking the right balance

S3connect

S3connect couples surface network models in GAP to one or more reservoir simulation models. The link provides a two-way coupling between the surface and sub-surface, allowing the creation of production forecasts that include the full complexity of the surface network pipeline dynamics and detailed modelling of the reservoir, including heterogeneity.

S3connect has a very simple interface for linking the GAP model to reservoir models, including the association of corresponding wells in the two systems. For fully compositional models the mapping between components can also easily be specified. Setting up a coupled system is therefore very straightforward, allowing engineers to concentrate solely on engineering problems.

APPLICATIONS

- Production forecasting and optimisation
- More accurate reservoir simulation with realistic surface constraints
- Gas lift optimisation studies
- Backout analysis
- Waterflood management
- Asset management and planning

KEY FEATURES

- Supports Eclipse, E300 and FrontSim
- Supports Compositional Models
- Connects multiple reservoir models
- Remote runs under UNIX/LINUX
- LSF job scheduling
- Automatic IPR curve generation
- Supports all GAP well types (including gas lifted)
- Supports fitted and table-lookup GAP IPR types

BENEFITS

- Easy to use for both production and reservoir engineers
- Couples to multiple simulators
- Cost effectiveness: couples to standard Eclipse and does not require the purchase of additional simulator licences
- Efficient use of simulator licences
- Robust
- Straightforward IT set-up, with minimal IT overhead
- Integrates with **S3GRAF** for easy viewing of results

TECHNICAL DETAILS

Full bi-directional coupling between surface and sub-surface is achieved by transferring the reservoir conditions to GAP in the form of well inflow performance data, which is then used in the surface network solution. The surface network solution is transferred to the reservoir models in the form of well controls for the next simulator time step. Thus, the run proceeds by taking data from the reservoir simulation(s) at each prediction time step, passing this data to GAP and solving the surface network. The network solve results in constraints on rates or BHPs which are then passed back to the simulator. A restart of the simulator including the new constraints is initiated, running up to the next prediction step (GAP network solve). This process is repeated for each step in the prediction schedule.

The key to coupling a reservoir simulation model to a surface network is the generation of inflow performance data (IPR curves) for each of the linked wells. **S3connect** has a number of options for controlling the generation of IPR data, and can provide the IPR data to GAP in several formats (three-phase tables, single-phase tables or parametric forms).

A number of options is provided for controlling the parameters passed between GAP and the reservoir simulation, and it is possible to modify the parameters that are passed from the simulator to GAP to account for known errors in the reservoir model that may have a negative impact on the accuracy of the surface network calculation (such as a less-than-perfect history match giving rise to errors in water cut for some wells in the simulation). This 'well calibration' functionality is also useful for performing simple 'what if' scenarios without the need to make changes to the simulation model—for example, to investigate the effect of wells watering out over varying timescales.

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