



MPath Whitepaper – Reservoir Fluids

Adding reservoir fluids and fluid mixing to MPath

The Permedia Research Group is developing a simulator that will model complex fluid movements in reservoirs at both production and geological time scales. The new simulator will both honor the underlying system physics and handle and rapidly simulate extremely high resolution models. A finite volume-based advection-diffusion solver has already been developed, providing the foundation for a multi-purpose advection diffusion and mixing modeling toolkit.

Applications

High-impact applications for the fluid mixing solvers include:

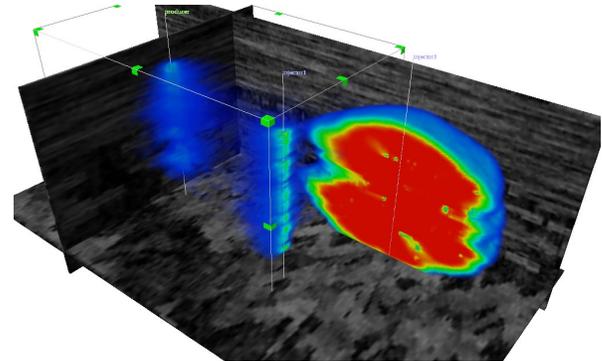
- Pressure studies: ability to build both static and dynamic very high resolution pressure volumes for well planning and reservoir descriptions
- Reservoir fluid continuity assessments: model fluid mixing to establish the likelihood of reservoir compartmentalization for appraisal and development projects
- Charge history and fluid alteration evaluations: integrate basin-scale and reservoir-scale processes for prediction of the distribution and quality of fluids within reservoirs
- Geochemical surveillance studies: create detailed fluid distribution models and use these to model time-varying attributes of produced fluids in production settings

Additional applications areas include:

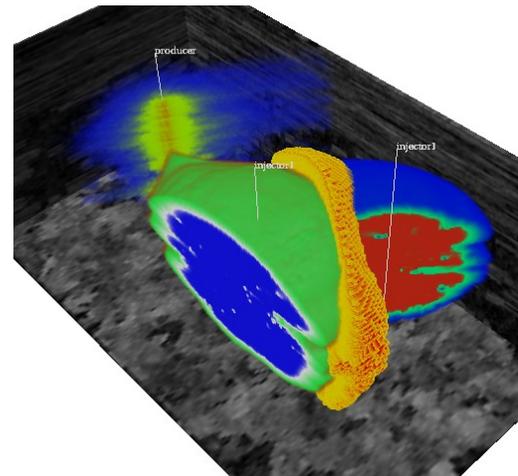
- Pore volume tracking: quantify the volume of fluid that has moved through a pore volume over a specified time period for fluid-rock interaction modeling
- Phase fractionation: model natural in-reservoir phase changes for hydrocarbon phase risk assessments
- Tracer studies: model tracer trajectories in reservoirs in which upscaling (for traditional reservoir simulators) or ray tracing is inappropriate

Reservoir fluids and fluid mixing project

The new reservoir solvers are being added to MPath as part of a three-year research project funded by the Permedia Research and Development Consortium. Started in 2005, the project will run for three years, leveraging MPath's existing high resolution rapid modeling capabilities.



Near-well fluid velocities and injected fluid concentrations



Injected fluid concentrations and mixing (orange)

Built on MPath

The new solver will be fully integrated with MPath, with its easy to use interface, advanced querying and visualization tools, and robust links to a variety of external formats, including Gocad, SEG-Y, and ZMap. The reservoir tools will also take advantage of MPath's risking framework, using both parallel and distributed processing. MPath uses standard distributed processing grids including Sun Grid Engine, OpenPBS and Platform LSF, and standard MPI routines for parallel computations.

For more information

For more information on MPath and the fluid mixing project, please contact us at

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