

INTEGRATED ENVIRONMENT FOR MODELLING CO₂ STORAGE PROJECTS

tNavigator brings geology, flow simulation, geomechanics and uncertainty analysis together in one platform.

From understanding trapping mechanisms and containment integrity to forecasting plume behaviour and storage capacity, **tNavigator** gives teams the tools to evaluate CO₂ storage performance with confidence.

ALL FOUR TRAPPING MECHANISMS IN A SINGLE SIMULATION

Structural trapping against a low-permeability seal, residual trapping via relative permeability hysteresis with scanning curves, dissolution trapping with salinity- and temperature-dependent CO₂ solubility, and mineral trapping through equilibrium and TST reactions precipitating CO₂ into a solid phase. Trapped, dissolved and mobile CO₂ reported separately per region.

GERG-2008 AND EIGHT FURTHER EQUATIONS OF STATE

Reference-quality thermodynamics for CO₂ and impure capture streams - 21 components covering the supercritical region, with automatic validity checking, CPA equations of state for water-associating systems, three-phase vapour-liquid-water flash, and Vesovic-Wakeham-Fenghour CO₂ viscosity.

COUPLED GEOMECHANICS FOR CAPROCK AND FAULT INTEGRITY

Flow and rock stresses solved on one grid - finite volume and finite element calculations are coupled, fully implicitly. Mohr-Coulomb and Barton-Bandis failure criteria predict caprock shear failure and fault reactivation, and the results define a maximum injection rate that maintains containment.

PROBABILISTIC PLUME FORECASTING ACROSS THE UNCERTAINTY RANGE

Latin Hypercube, Monte Carlo, Tornado and Plackett-Burman designs sample geological and fluid uncertainty. Quantile analysis, clustering, PCA and Pareto ranking process the ensemble; response surfaces, neural network proxies and the ensemble smoother make hundreds of realisations tractable, yielding P10-P50-P90 outcomes for plume extent, storage capacity and containment.

ONE PLATFORM FROM GEOLOGICAL MODEL TO STORAGE FORECAST

Geoscience, PVT, simulation, geomechanics and the uncertainty workspaces in a single environment with a shared data model. GPU-accelerated computation, parallel geomechanics on CPU, and built-in history matching against monitoring data.

WANT TO LEARN MORE ABOUT INTEGRATED RESERVOIR MODELLING?



Seismic - visualise and interpret subsurface features



Geology - structural and reservoir characterisation



Simulation - fast dynamic modelling with hybrid CPU/GPU



Geomechanics - fully coupled, well, subsurface & surface integrity



Facilities - integrated reservoir, well & surface network modelling



Uncertainty - forecasting, sensitivity & optimisation



AI - intelligence embedded throughout the entire workflow