FEFLOW

All-in-one groundwater modelling solution

Groundwater projects are becoming more and more demanding - requiring modelling software with more sophisticated capabilities than ever before. FEFLOW provides best-in-class technology for groundwater flow, contaminant, groundwater age and heat transport simulations. With its efficient user interface and its yet unmatched range of functionality and flexibility, FEFLOW has become a standard in premium groundwater modelling over the last 35 years.

Applications

FEFLOW is applicable for a multitude of groundwater, porous media and heat transport projects - from local to regional scale.

Typical Applications

FEFLOW is the ideal software for:
- Regional groundwater management
- Groundwater management in construction and tunnelling
- Capture zone and risk assessment via groundwater-age calculation
- Mine water management
- Simulation of open-pit progress
- Seepage through dams and levees
- Land use and climate change scenarios
- Groundwater remediation and natural attenuation
- Geothermal energy (deep and near surface, both open-loop and closed-loop systems)
- Groundwater-surface water interaction
- Simulation of industrial porous media

Finite Elements

FEFLOW uses finite element solution techniques to handle a broad variety of physical processes for subsurface flow and transport modelling. The advantages of the finite element method include:
- Flexible meshing strategies allow for detailed models of complex geological structures
- Layer-based, partially unstructured or fully unstructured (tetrahedral) meshes in 3D
- Precise spatial representation of features, such as rivers, fractures, pipes, tunnels and well locations
- Accurate representation of sloping layers and anisotropy

FEFLOW supports dynamic deactivation and reactivation of mesh elements to account for geometry changes in the model domain over time.

3D groundwater models are computationally demanding. Thus, FEFLOW employs optimised numerical solvers, for example by making use of parallel computing on multiprocessor and multicore machines.

The highly nonlinear Richards equation is further stabilised using the Control-Volume Finite Element method.

Features

FEFLOW supports a wide range of physical processes.

General
- Transient conditions
- Steady state conditions

Flow Modelling
- Darcy flow in porous media
- 2D/3D unsaturated flow
- Free surface (phreatic) flow
- Density dependent flow
- Fracture and pipe flow

Mass Transport Modelling
- Advection-diffusion/dispersion solute transport
- Single and multispecies solute transport
- Equilibrium sorption
- User-defined kinetic reactions
- Fracture mass transport
- FEFLOW links with PHREEQC-RM for geochemical modelling

Groundwater Age Modelling
- Capture zone analysis
- Exit probability calculation

Heat Transport Modelling
- Advection-conduction/dispersion heat transport
- Fracture heat transport
- Thermohaline convection
- 1D borehole heat exchanger elements and heat exchanger arrays

Groundwater-Surface Water Interaction
- For river flow modelling, FEFLOW links with MIKE 11, the world-known predecessor of MIKE HYDRO River
- For integrated overland/subsurface modelling, FEFLOW links with the powerful MIKE 21 Flexible-Mesh engine

Open-pit mine
ONE FOR ALL
Regardless of whether the simulation task at hand is regional groundwater flow in the capture zone of a water supply well or formation of temperature and salinity induced convection cells in a large basin, FEFLOW provides all the support you would ask of a software product.

FEFLOW covers everything from the first pre-processing steps to supporting you in presenting results to clients or to the public - even after post-processing and reporting.

UP-TO-DATE VISUALISATION TOOLS
FEFLOW provides excellent planar, cross-sectional and 3D visualisation features. Present your modelling results as high quality snapshots or in video sequences, for example for moving plumes of contaminants.

Steroscopic visualisation and image/video export provide a level of insight into complex simulation models that has never been reached before.

Today, FEFLOW also exploits the Virtual Reality technology. Dive inside your mesh to access its secret regions!

OPEN PROGRAMMING INTERFACE
FEFLOW is designed to handle plug-ins for extended functionality. A convenient programming interface makes plug-in development a manageable task - even for less experienced programmers. A number of plug-ins for specific needs are readily available.

GET THE FREE VIEWER
In viewer mode, FEFLOW’s advanced visualisation and post-processing capabilities are available free of charge. Model reviewers and clients no longer need a software licence to evaluate input data and simulation results.

BENCHMARK SIMULATIONS
Users of complex simulation software such as FEFLOW, expect reliability, accuracy and efficiency.

All parts of the FEFLOW simulation engine have passed extensive benchmark testing against analytical solutions, physical laboratory test results and results from other well-known simulation systems.

OUTSTANDING TRADITION
Since 1979, FEFLOW has been constantly developed and applied to different types of groundwater and porous media simulation projects. Through these developments, we have provided a convenient graphical user interface since the late 1980s. For decades, it has been the trusted choice of leading groundwater modellers worldwide.

If your project requires accurate representation of the geology through flexible mesh modelling - even with time varying geometries - FEFLOW is the answer.

Thousands of users around the world know that highly-qualified support for complex groundwater modelling is only an email or a phone call away.

The very active FEFLOW user community shares application experience via the MIKE User Forum and other online groups. Use these platforms - even if you are not a FEFLOW user yet.

Regular user group meetings and FEFLOW conferences provide good opportunities for physical community gatherings.

The FEFLOW package features FePEST, a graphical user interface for using PEST by John Doherty with your FEFLOW models. The convenient graphical interface of FePEST guides you through all steps of parameter estimation and uncertainty analysis. For increased efficiency, these tasks can be executed in parallel on multiple computers - with just one single corporate licence.

FEFLOW includes a licence for WGEO, an excellent tool for georeferencing and processing of spatially related raster data as well as for transformation of raster and vector data. WGEO enables quick and efficient rectification and georeferencing of data sets for use in simulations.

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