

Applications suite for geophysical computations

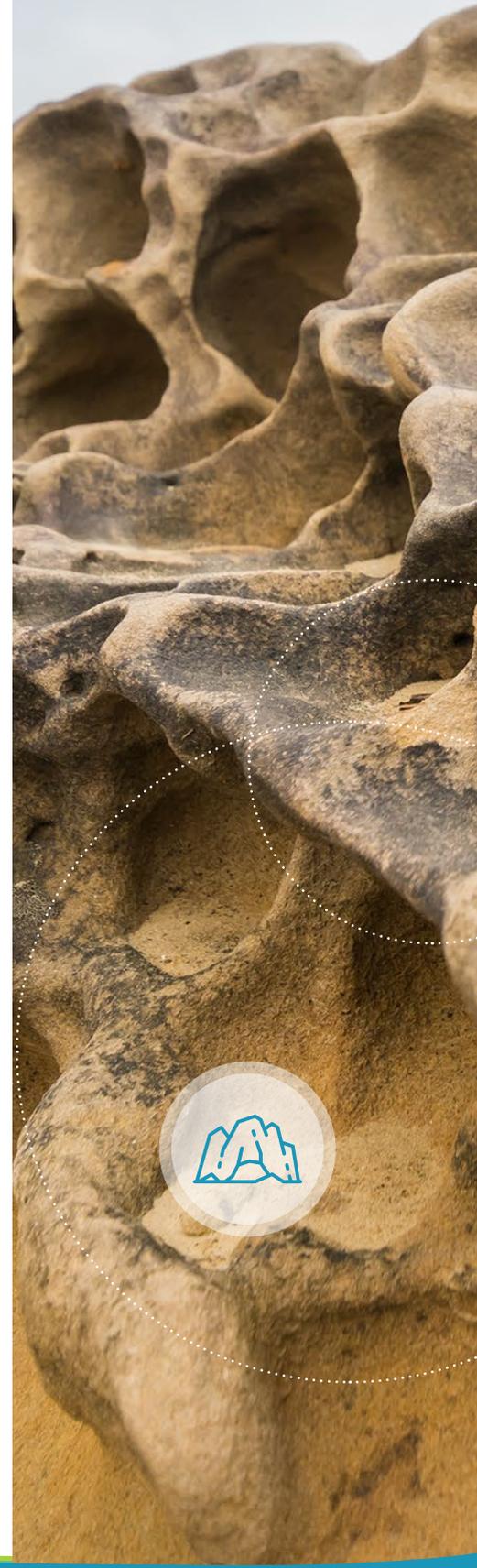
High-performance computing for geomechanical calculations and simulations of seismic wave propagation in three-dimensional inhomogeneous anisotropic media, with account for fracture influences.

The software package allows to effectively solve complex geomechanic and seismic modeling problems, with account for fractures, non-linear processes, elastoplastic deformations of media, temperature deformations and for the complex geometry of resource reservoirs and boreholes.

Provides functionality for the calculation of effective media properties based on both user defined media geometry and the tomographic imaging of samples.



Geophys



Precision modeling

Up to 5 times improved accuracy of calculations as a result of an advanced implementation of borehole and surface seismic events numerical modeling based on a modified method of finite elements. The underlying calculations engine uses the explicit algorithm with spectral convergence and a user-selectable approximation order of accuracy in space.

To solve active and passive seismic problems a complex mechanical input is used, which is composed from three-dimensional anisotropic elasticity equations with account for thermoelastic effects and induced anisotropy caused by the inhomogeneous field of the initial geomechanic deformations.

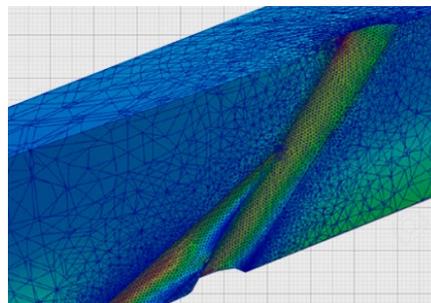
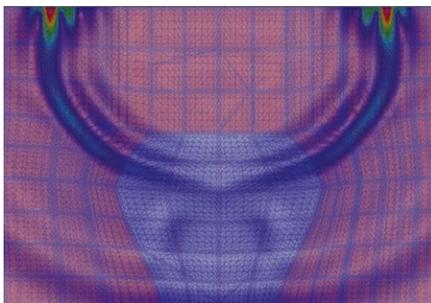


Geomechanical computations

Modeling of nonlinear processes occurring in rock formations, with account for elastoplastic deformations of the media, the apposition of layers at the boundaries of tectonic rifts and thermal strains.

Geomechanical research of stress distribution in seams in the vicinity of resource reservoirs and drillholes, including curved and branching holes.

Optional account for fracturing, array media anisotropy and non-linear effects in the mine's bottom zone within computations.



Function modules

For specialized tasks, we offer three functional modules:



Fidesys Dynamics



Fidesys Composite



Fidesys HPC

Digital research of cores

Research of the effective properties of media (the creation of a virtual laboratory to assess the mechanical characteristics of the core and the digital analysis of cores based on tomographic imaging data).

To evaluate the average elastic properties of porous and fractured material on a microscopic level the effective medium theory is applied.

As part of the effective medium theory a digital model of the core is subjected to a series of virtual tests on compression and shear, in each of which stress fields are calculated and averaged by the core's volume.

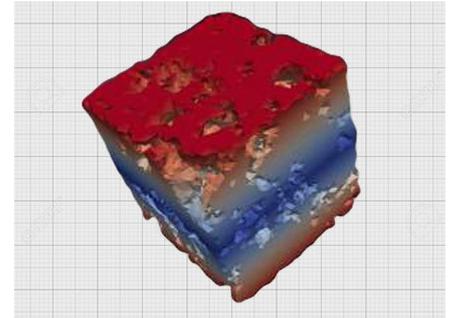
On the basis of the obtained averaged stresses and the deformations set during testing the effective characteristics of the core are computed.

Calculations on a representative volume

Calculations of the effective moduli of rock are produced by numerical methods using calculations based on a representative volume — this allows to estimate the effective properties of composites with arbitrary geometry.

The ability to export the effective media

The application suite supports the ability to perform calculations based on the obtained effective property constants of orthotropic or isotropic materials with the export of the latter into XML and the possibility to import it back into Fidesys for use in further calculations.



Automatic generation of the geometry

The suite also supports the ability to automatically generate the geometry of representative volumes (periodicity cells) of the main anisotropy types of rocks from user-defined geometric parameters.

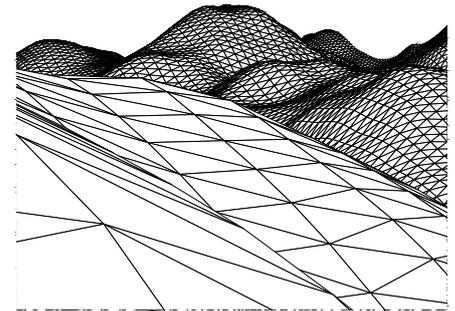
Fidesys Viewer

Fidesys Viewer is a free application for post-processing, analysis and visualization of the calculation results with various filter possibilities.

This product will be of interest to engineers, scientists and researchers who need to visualize the results of their strength computations and measurements.

Features

- Visualization of vector and tensor fields.
- Drawing charts and graphs.
- Analysis of dynamics.
- Large selection of filters.
- Export to popular formats.



You can download a fully functional trial version of the software from www.cae-fidesys.com

The company

The engineering company Fidesys was founded in 2009 by specialists and graduates of the Department of Computational Mechanics of the Lomonosov Moscow State University. The company has residential status in the Skolkovo Innovation Centre as well as residential status in the Moscow State University Science Park.

Fidesys is a member of NAFEMS — The International Agency for Finite Element Methods and Standards. The testing of CAE Fidesys is carried out in strict accordance with NAFEMS standards.

Our partners:

