SYNOPSYS®

Simpleware Software for Digital Rock Physics and Geomechanics

Key Benefits

- Intuitive, User-Friendly Interface
- Quick and Accurate Segmentation
- Advanced 3D Image Processing
- Export High-Quality Meshes for Simulation
- Develop Automated Workflows
- Expert Technical Support

Key Features

- Import Images from Multiple Modalities
- Animation Toolbox
- Measurements and Statistics
- Automated Multi-Part Meshing
- Calculate permeability of porous material samples
- Export to FE or CFD Packages

Why Simpleware Software?

Simpleware™ software offers a fast, easy-to-use solution for generating robust models from image data for digital rock physics and geomechanics applications. Quickly process image data to visualize and quantify core samples and other geological materials. Take advantage of powerful meshing tools to export simulation-ready FE/CFD models to all leading solvers, streamlining complex workflows.

Intuitive and Customizable

We pride ourselves on the ease-of-use of Simpleware software. Users new to the software can start processing image data within a short time frame, and very quickly visualize and identify regions of interest. Our range of fully automated, semi-automated and interactive segmentation tools allow even the most challenging image datasets to be processed efficiently. Extensive quality checks in the software guarantee that FE and CFD models are ready-to-use, while scripting tools and plug-ins make it straightforward for users to customize the software.

## Dedicated Support and Training

Our expert technical support team are here to help you get the most out of the software, including step-by-step guidance and personalized support. We also regularly offer classroom training courses at our offices, or you can arrange customized training sessions online or at your site.

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synopsys.com/simpleware
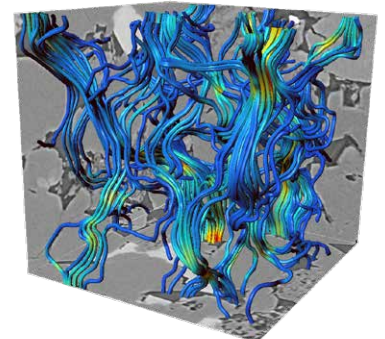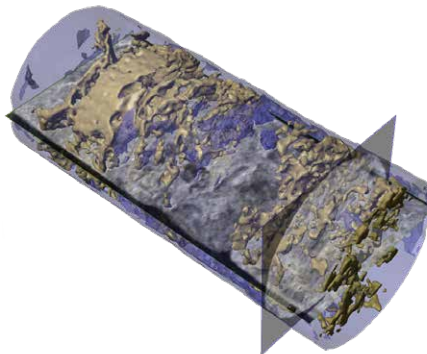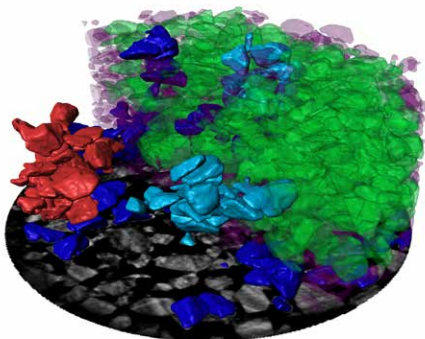
Digital Petrophysics for Cost Effective Reservoir Analysis

C. Santos, **Repsol Technology Center, Spain**

Requiring vast amounts of detailed petrophysics information, the traditional costs of gathering data for reservoir modelling and forecasting are significant. Digital Petrophysics Characterization (also Digital Rock Physics/Analysis) has been a technology breakthrough for Oil and Gas. Compared to methods using approximate rock physics models, digital petrophysics allows information to be obtained from realistic rock images at a fraction of the cost. With the help of Simpleware software, Repsol have been able to simplify these digital petrophysics workflows. Repsol's digital petrophysics workflow is producing meaningful inputs for rock typing and reservoir characterization with the highest value solution available.
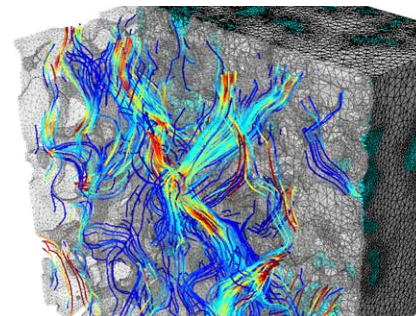

Flowlines through porous rock material in Simpleware FLOW module

Shear Modulus Simulation of Asphalt Mixtures

E. Coleri • J. Harvey • K. Yang • J. Boone, **University of California Davis, USA**

Asphalt concrete mixtures used for pavements and roads are susceptible to deformation and rutting over time. By characterizing asphalt mixtures through Finite Element modelling and non-destructive evaluation, researchers can reduce costs compared to physical testing. Simpleware software was used to develop 2D and 3D micromechanical FE models for predicting the shear modulus of two asphalt mixture types. X-ray Computed Tomography (CT) scans were processed in Simpleware ScanIP and meshed in Simpleware FE to produce 2D and 3D computational models suitable for simulating a shear frequency sweep at constant height (FSCH) test in SIMULIA Abaqus®.
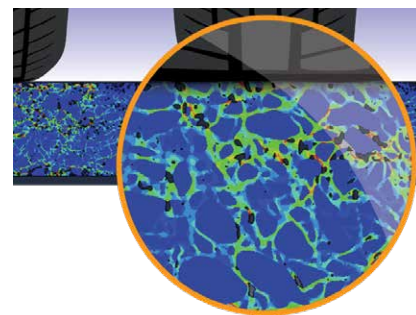

Behavior of asphalt mixture under FSCH loading in SIMULIA Abaqus®

Mesh Generation from Shallow Seismic Geophysical Data

S. Gunturu[1] • I. Elliott[1] • J. Templeton III[2], **[1]Petrabytes, USA; [2]SAGE, USA**

Shallow geophysical data can be used for foundation analysis for offshore structures. While substantial foundation zone data is typically used for planning and designing offshore structures, the geotechnical and geophysical data is often used for complex 3D interpretation. However, this interpretation is then used for highly simplified interpretations for foundation analysis, which discards interpretation details. More realistic results can be obtained by converting this data into a detailed 3D mesh for finite element foundation analysis. Petrabytes software was used to convert 3D seismic data into high-resolution images, with Simpleware software then used to generate very high quality meshes for simulation in SIMULIA Abaqus®.
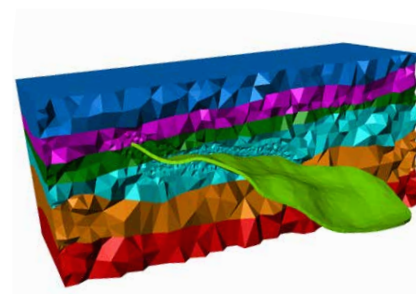

Finite element mesh generated from seismic data showing conformal surfaces of horizons

Impact of Compaction on Soil Aggregates

University of Sheffield, UK; University of Leeds, UK; BOKU Vienna, Austria

Soil aggregates are complex structures with pore systems that control gas and water storage and fluxes within soil. They can be destroyed during swelling and shrinking due to mechanical compaction. This has a serious potential effect on water infiltration and movement, as well as on biological activity and the growth of crops, influencing land degradation. Researchers have used 3D imaging and Simpleware ScanIP to study pore size distribution between aggregates (interpores) and within aggregates (intrapores) in pre and post-compacted soils at different soil moisture contents and two bulk density levels. This, in combination with lattice Boltzmann modelling, simulated the effect of compaction on water flow.
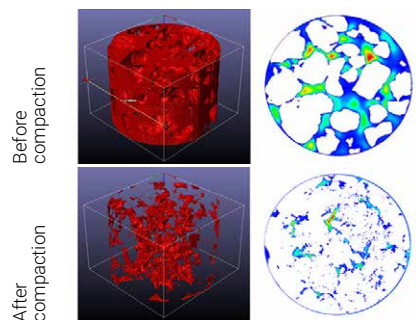
Soil aggregate before and after compaction: 3D views and 2D cross sectional view of velocity distributions

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