

MAVI FeelMath

Software for image based material characterization

In a nutshell, **MAVI FeelMath** allows you to make predictions about the macroscale behavior of heterogeneous materials directly from voxel data such as microtomographic reconstructions.

Description

MAVI FeelMath combines image processing and material characterization. Using the established image processing techniques of MAVI, it enables you to preprocess, segment and characterize the 3D microstructure directly from micro-tomographic (μ CT) reconstructions. Building on the thus created microstructure (voxel model), the robust and fast numerical solvers of FeelMath can be applied to compute thermal, elastic and acoustic material behavior and permeability of porous materials – without the need to switch to any different tool.

Using the voxel model of the microstructure and the physical properties of the material constituents, which are provided by the material database of FeelMath, the effective macroscopic properties – all entities of elasticity, permeability and conductivity tensors – can be computed. This is done without generation of computational meshes (i. e. FE mesh) and without any simplifications of complex microstructures.

Additionally, FeelMath can estimate the precision of the predicted properties by calculating hard lower and upper limits. The plastic yield, damage or creep of one or several constituents can be taken into consideration by user-defined material routines. MAVI FeelMath integrates 3D image processing and determination of material parameters into one tool on a desktop computer.

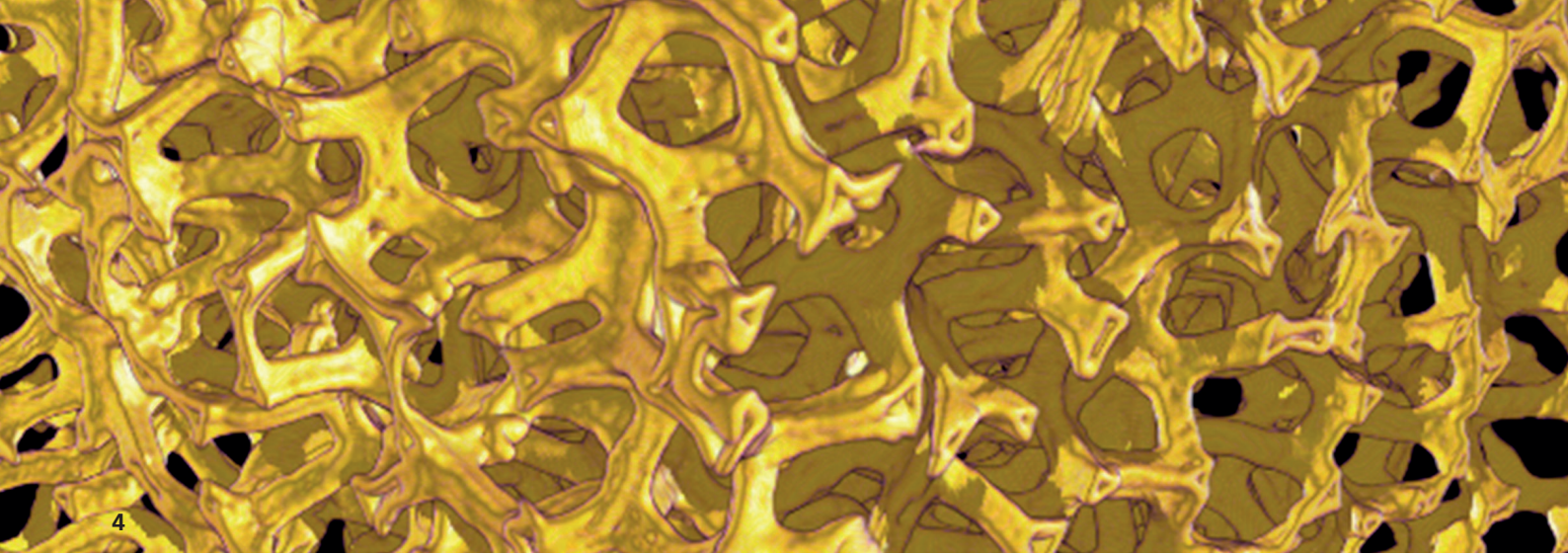
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1 CT-reconstruction of a glass fiber-reinforced polymer specimen (3.5 μm pixel spacing)

2 Segmentation of the fiber system

3 Von Mises stress under uniaxial loading

4 CT-reconstruction of an open metal foam (6.3 μm pixel spacing)

5 User interface of MAVI FeelMath

Features

All image processing and simulation can be applied on 2D and 3D data.

Image processing and analysis

- Image denoising
- Image binarization
- Image segmentation and labeling
- Cell and particle reconstruction
- Geometric characterization

Visualization

- Rendering of images and simulation results

Material characterization

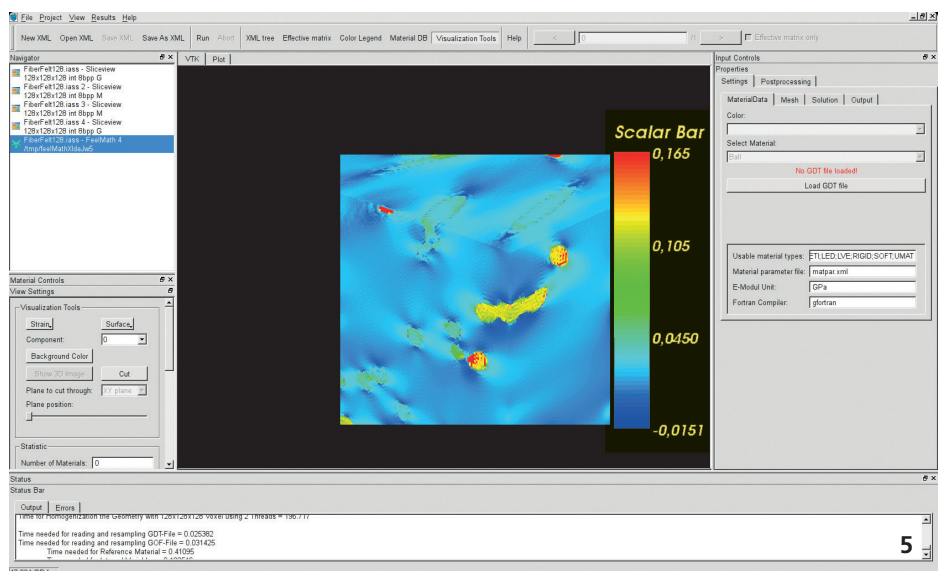
- Thermal behavior
- Elastic behavior
- Elastoplastic behavior
- Viscoelastic behavior
- Acoustic behavior
- Permeability resp. flow resistivity
- Fluid–structure interaction

Applications

- Open and closed foams
- Metals
- Polymers
- Ceramics
- Fiber reinforced polymers (glass, carbon, ...)
- Wovens and Non-wovens
- Concrete
- Paper and paperboard

System requirements

- At least 16 GB RAM
- NVIDIA graphics adapter
- Linux or Windows 64-bit



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