Generation of weaves, foams, sponges, sphere packings and sintered materials

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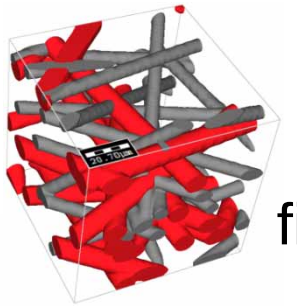
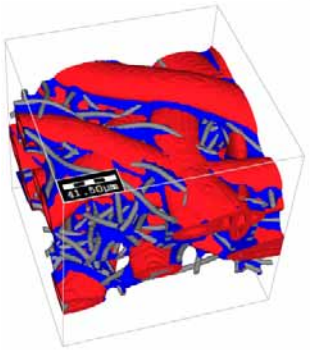
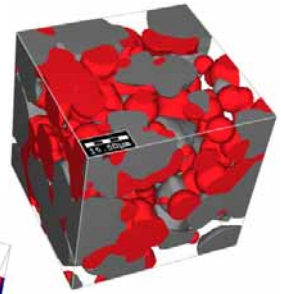
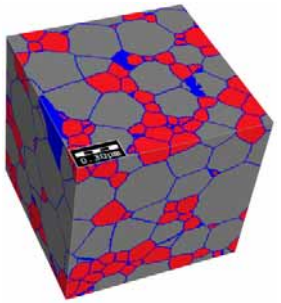
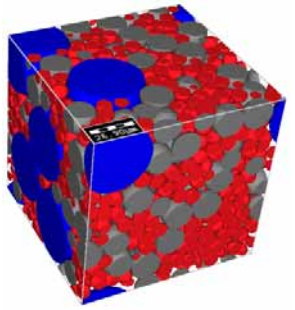
GeoDict Material Models

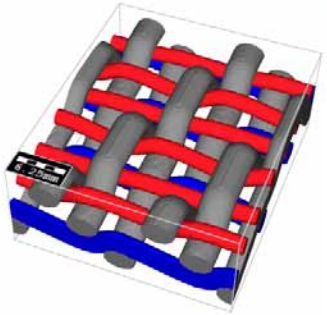


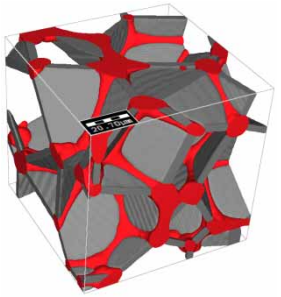


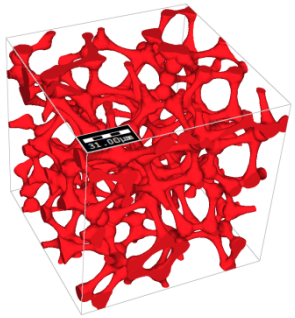












nonwovens

fiber reinforced composites

papers

ceramic materials

rocks

dense (sphere) packing

woven materials

foams

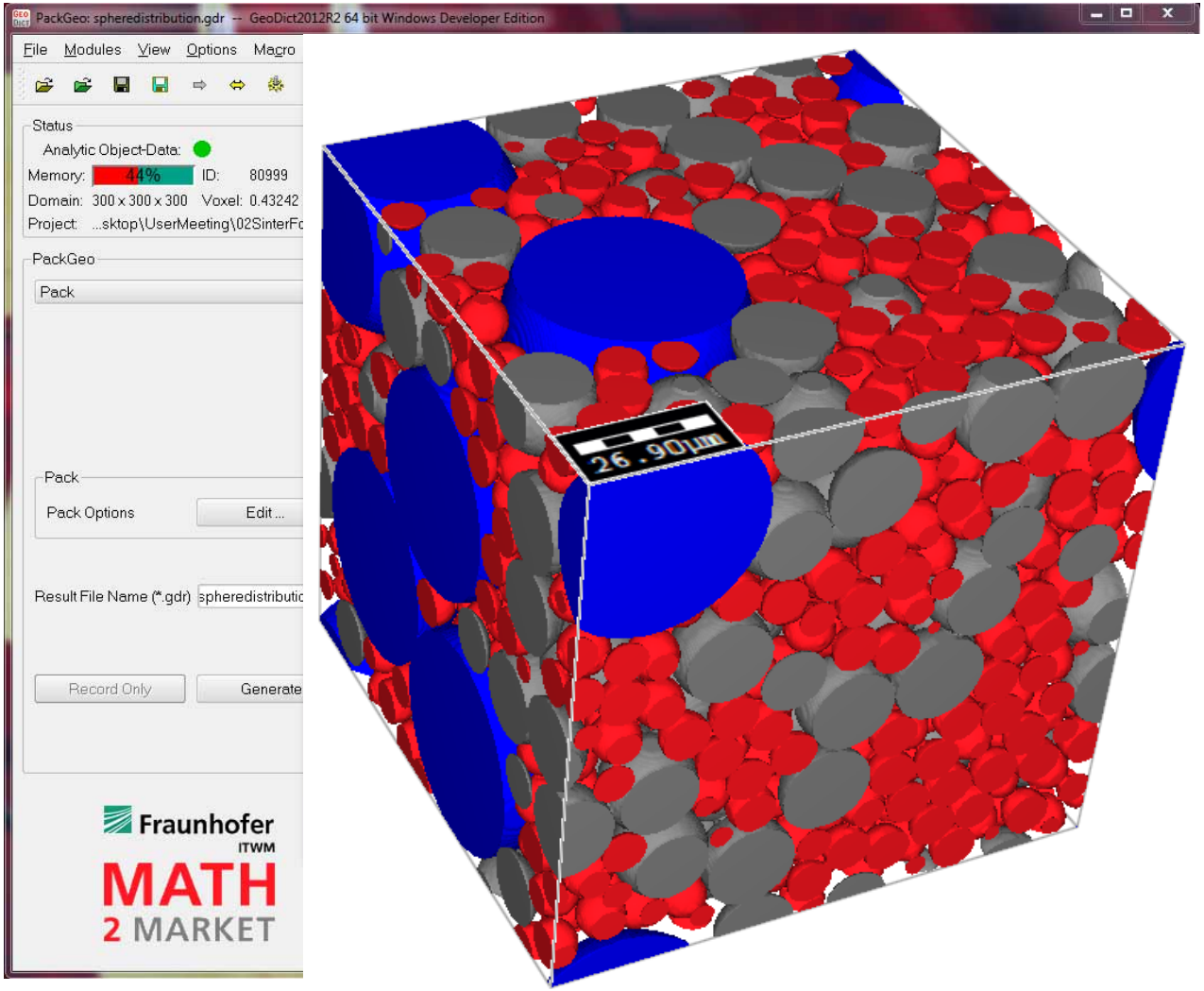
sponges

regular materials

PackGeo: Dense Sphere Packings

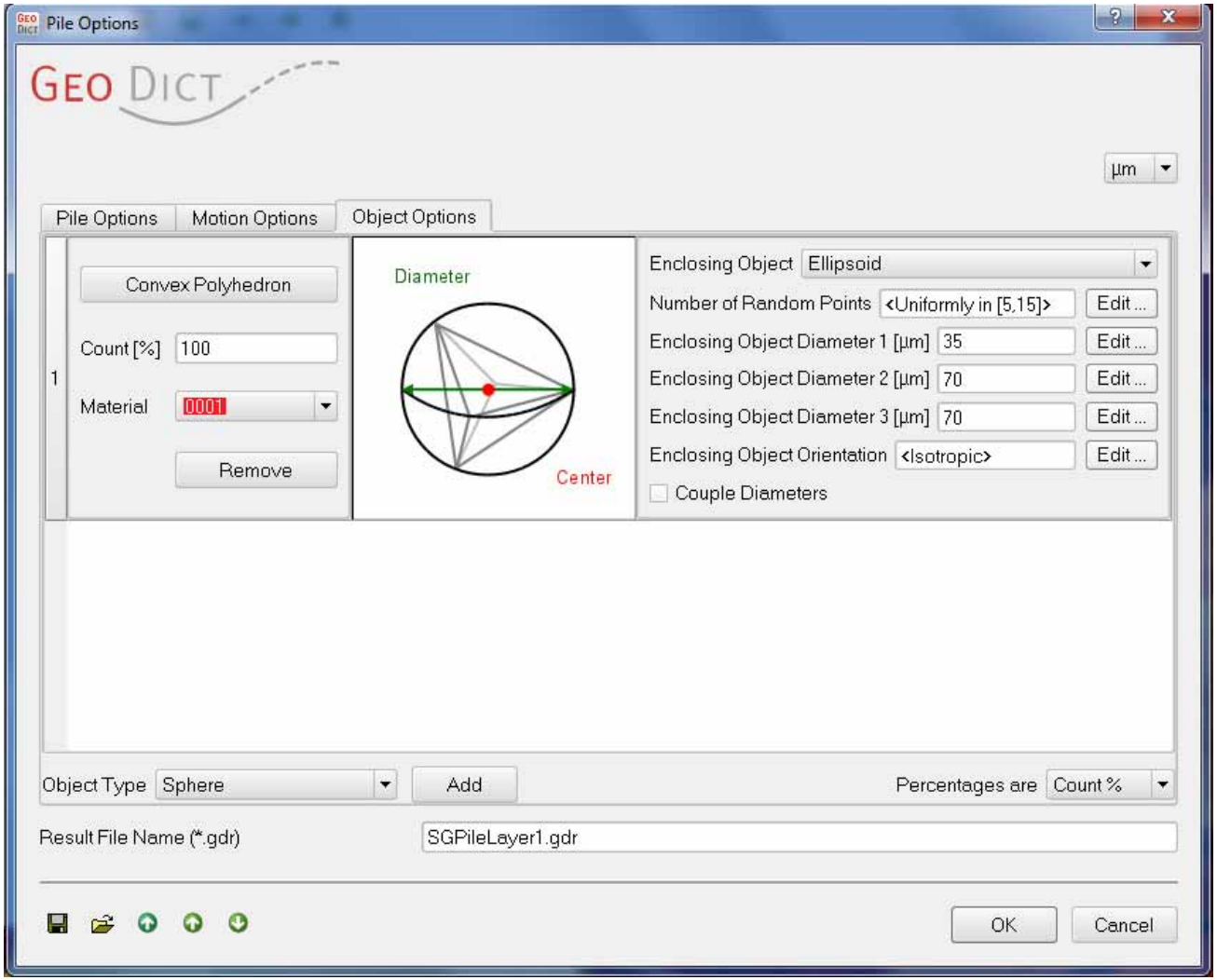
Generate dense sphere packings

- Large diameter differences
- Large number of spheres
- Fast implementation of the force-biased algorithm
- Very high packing densities (>60%)

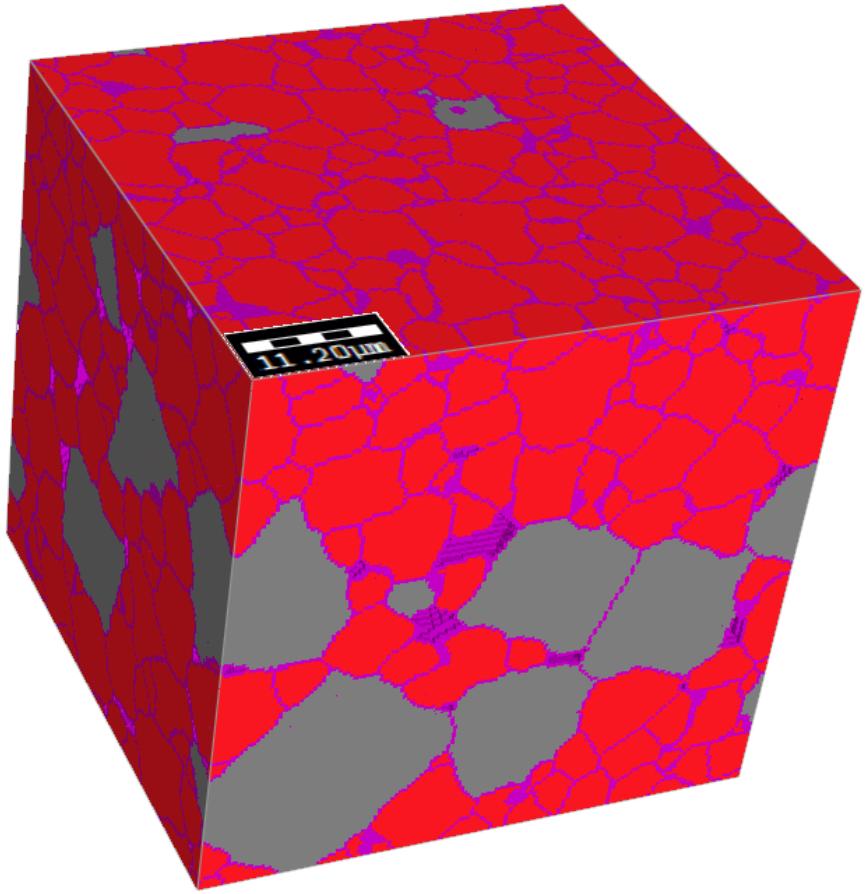


SinterGeo: Packing & Sinter Material

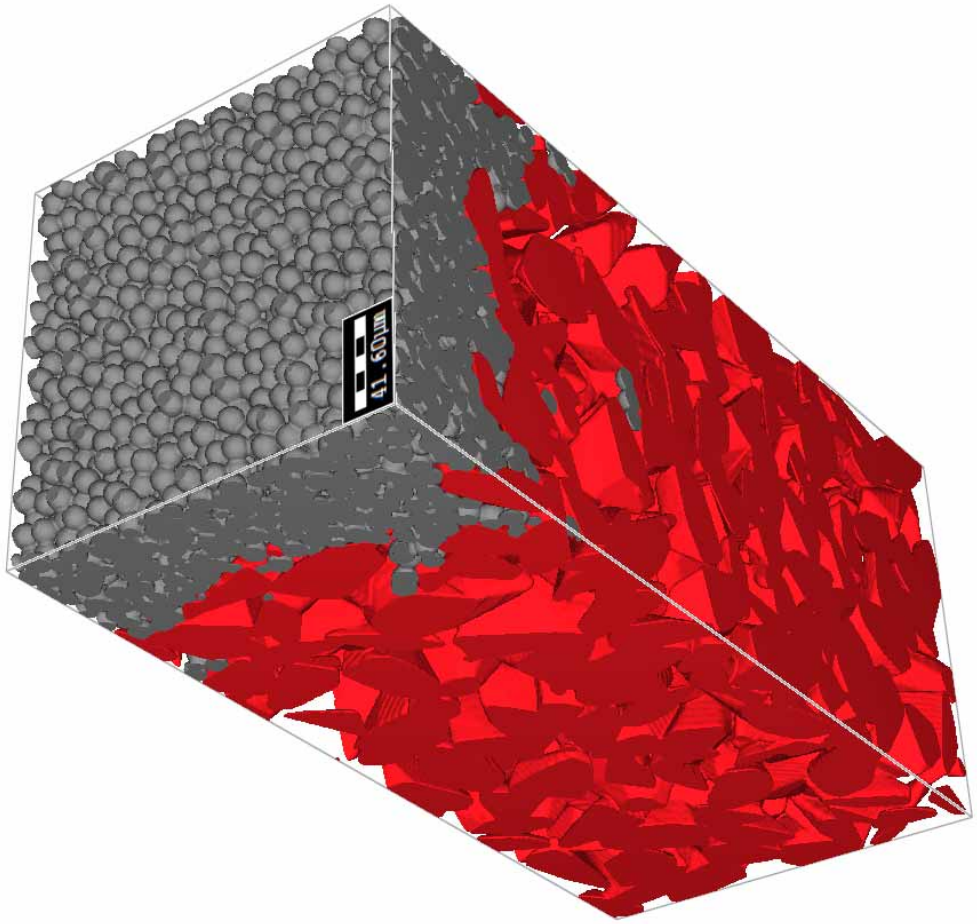
- Create or pile arbitrary objects
- Packing density about 50%
- Generate ceramics
- Generate rock models
- Generate sinter structures



SinterGeo Examples



PZT-ceramics



2-layer ceramics (soot filtration)

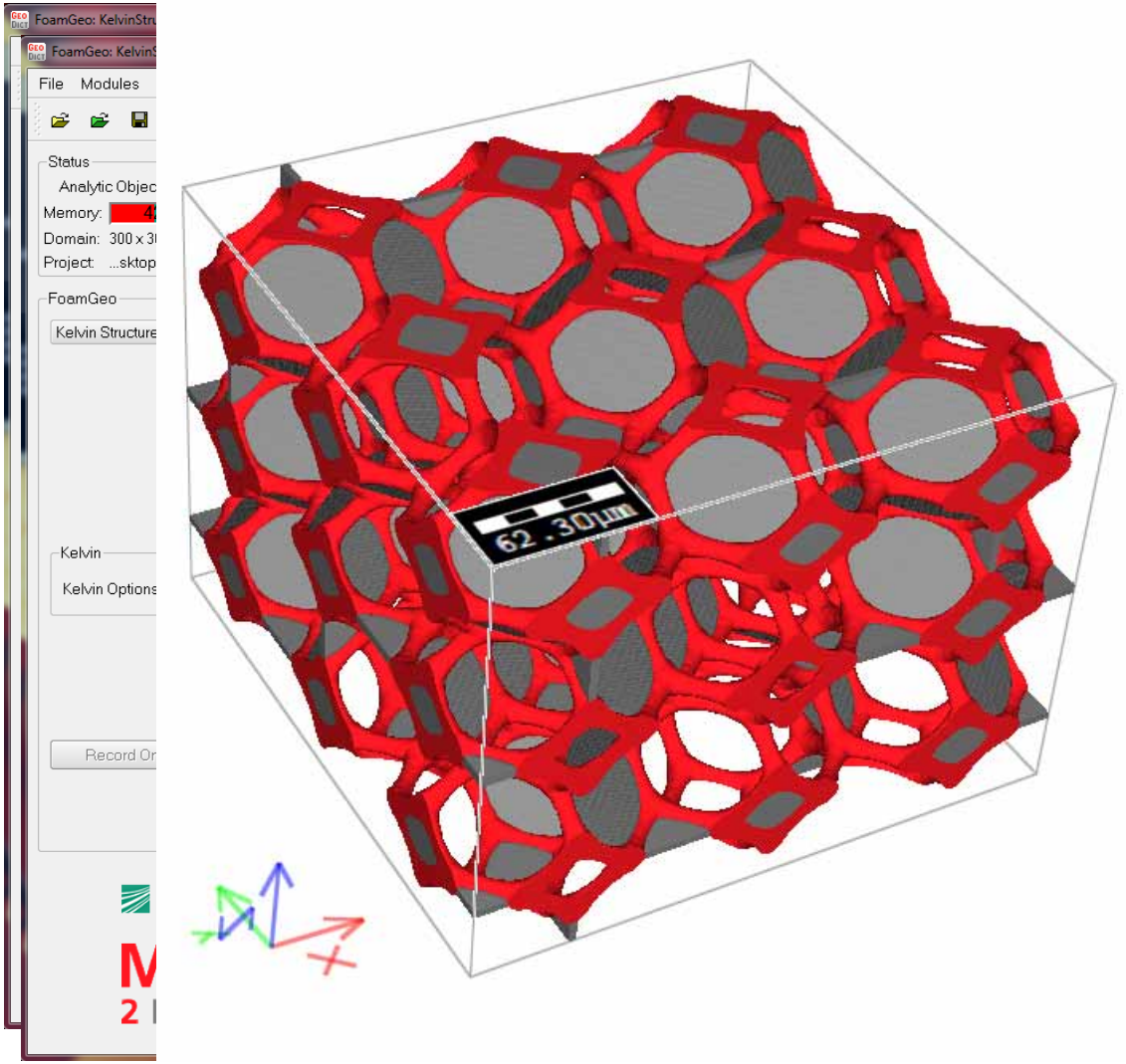
FoamGeo

Create

- Regular Foam (Kelvin Structure)
- Random Foam

Kelvin Structure:

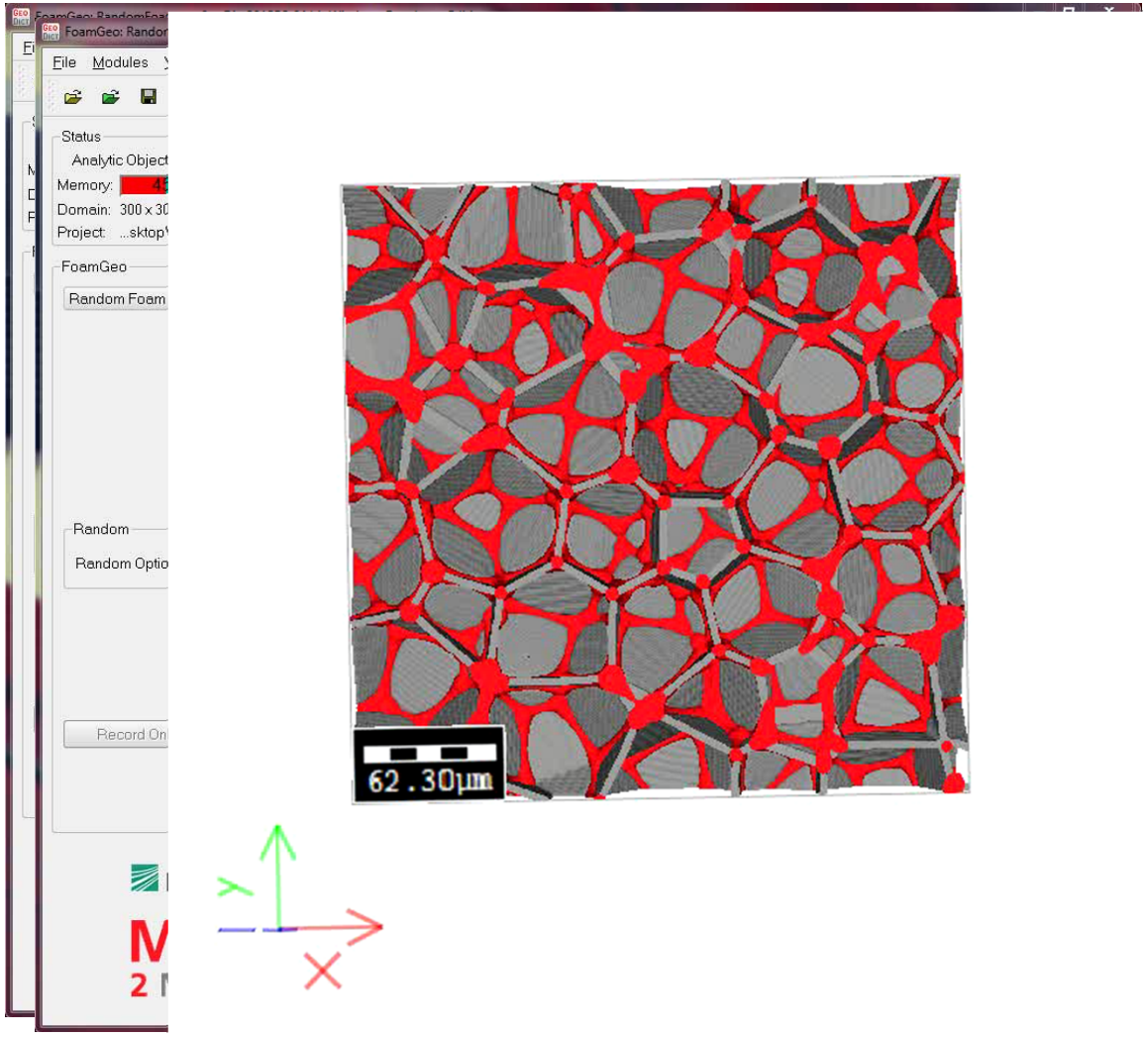
- Different scaling of the unit cell
- Different rod shapes
- Open or closed cell walls



FoamGeo: Random Foam

Based on distance map of a pile of spheres, ellipsoids, ..

- Different scaling of the unit cell
- Different rod shapes
- Open or closed cell walls
- Complex distribution of basis objects possible

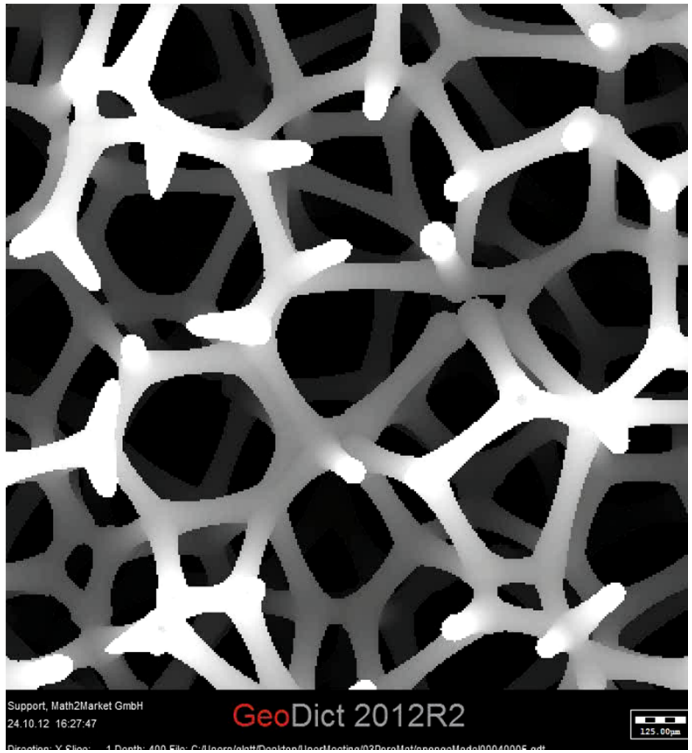


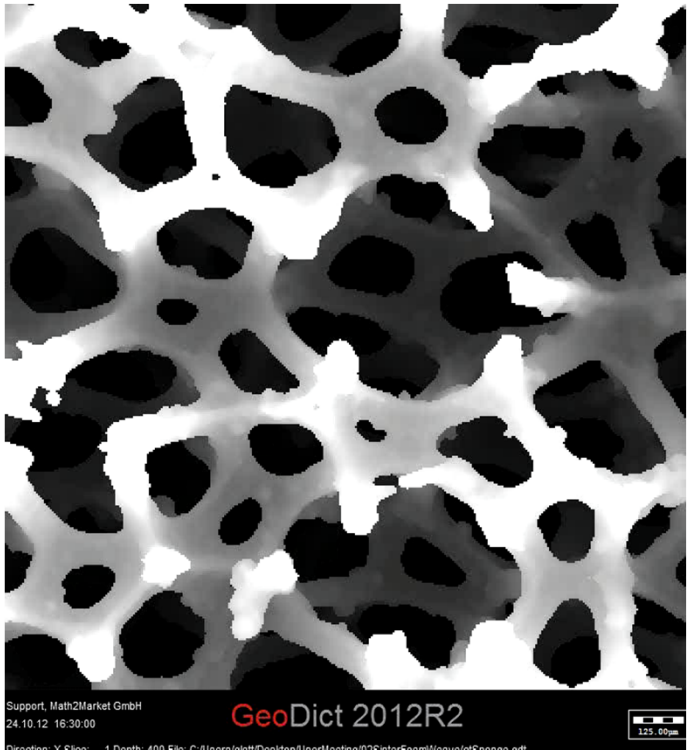
FoamGeo: Sponge

Create a model for the CT-image of a sponge (see. presentation about the ImportModule):

- Rod parameter measured from the segmented CT-image
- Match pore size distribution, calculated with PoroDict

model





CT-image

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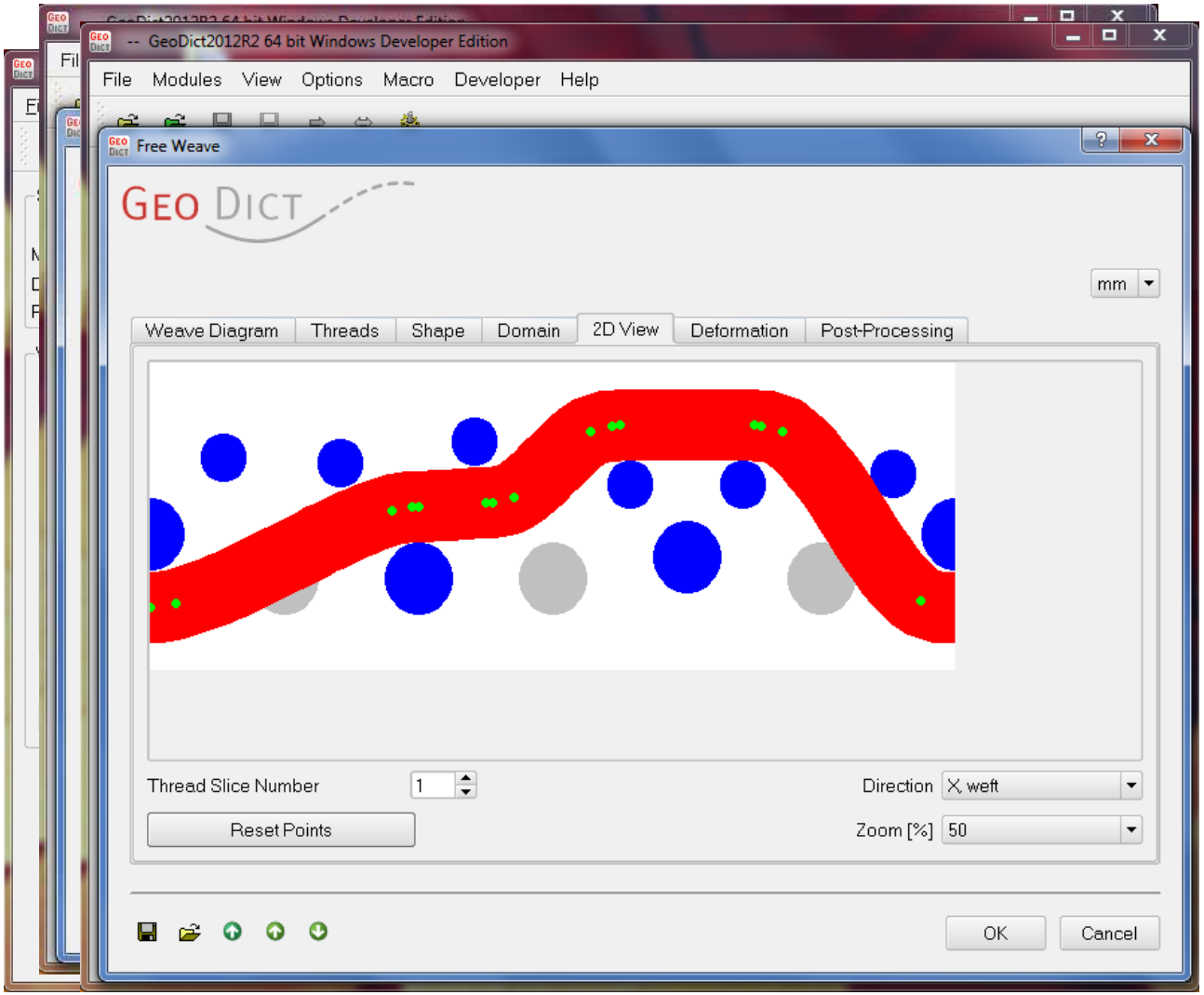
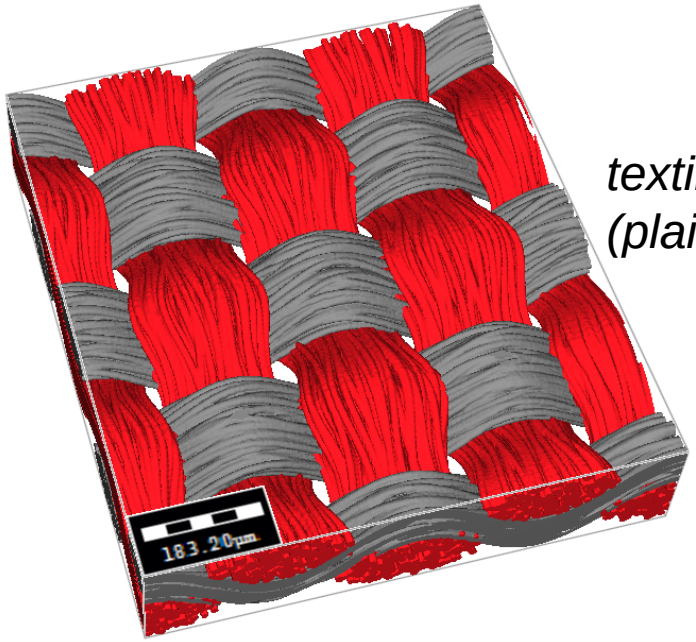
WeaveGeo: Woven Material

Generate woven structures:

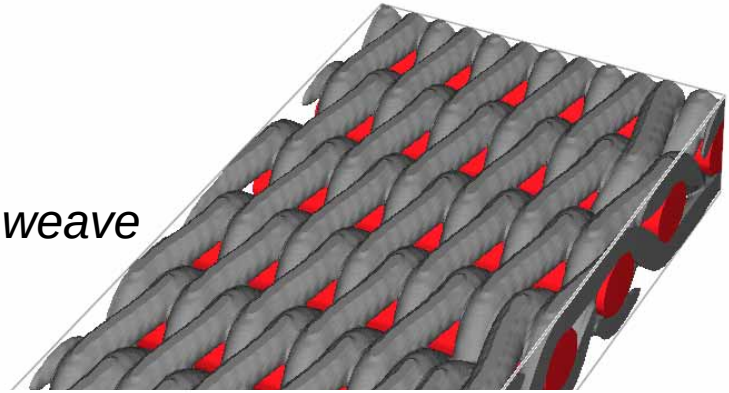
- Simple GUI for one layer weaves with standard weaving patterns
- User-defined weave diagram
- Multi-layer weaves
- Multifilament weaves and ropes
- Weave preview and post processing



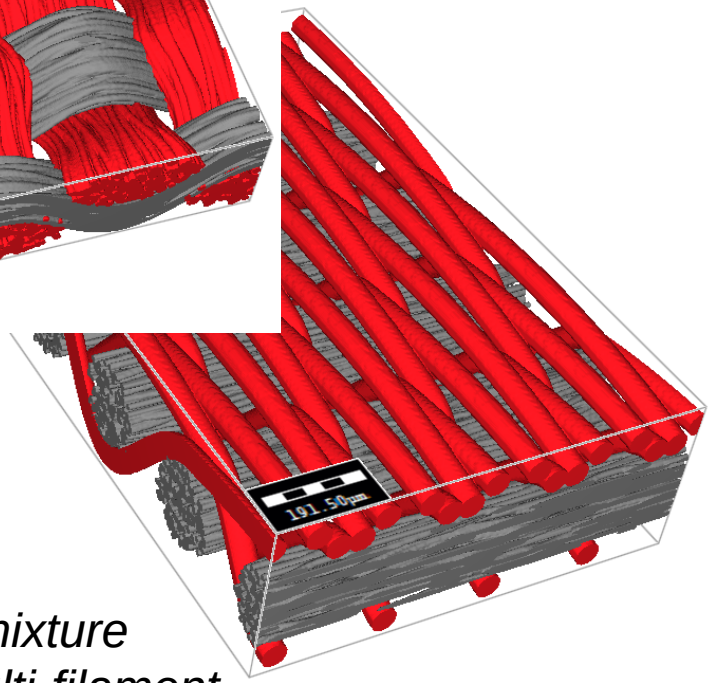
WeaveGeo Examples



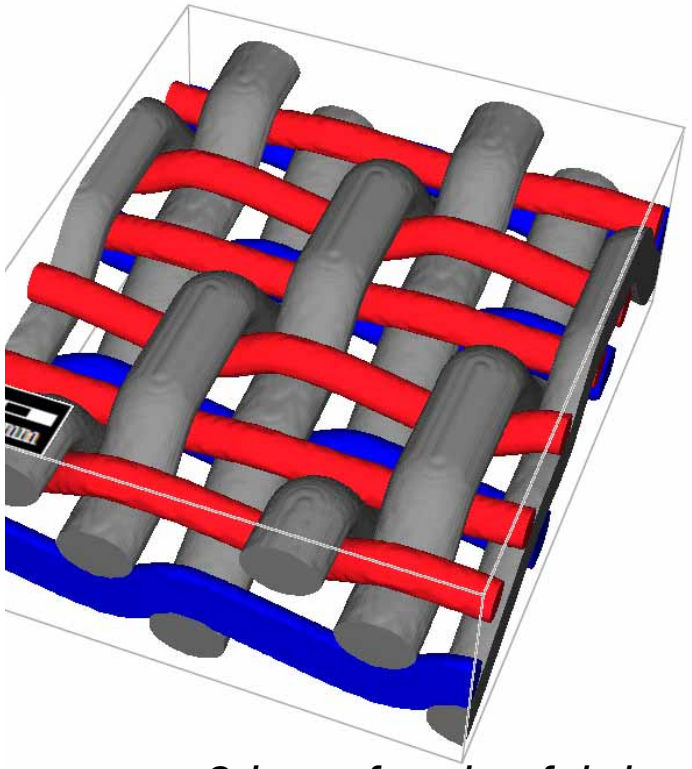
textile material (plain weave)



twilled Dutch weave



satin weave, mixture mono- and multi-filament



2-layer forming fabric

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Conclusions

- The structure modeling is a centerpiece of GeoDict
- The structure models improve constantly
- With the new release GeoDict is able to model foams and sponges

Outlook

- We are working hard to approach our aim to model any micro structure