

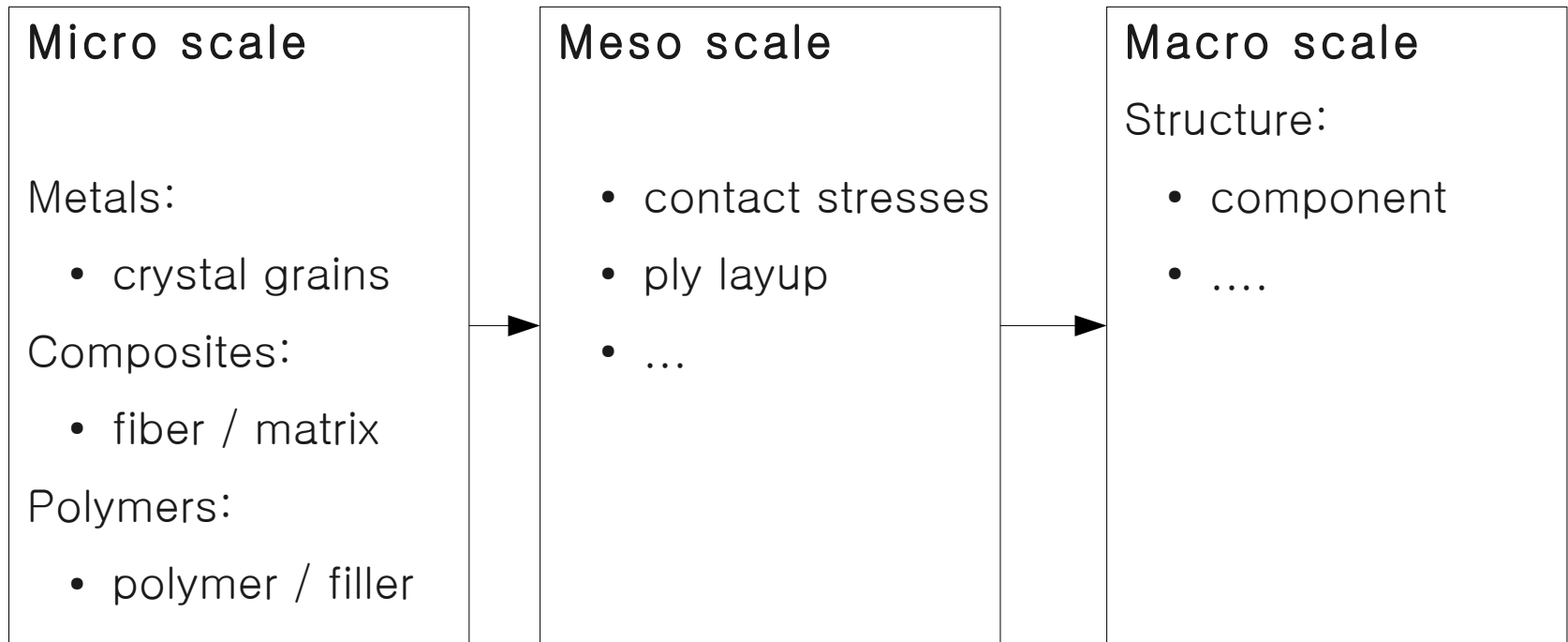


Multi scale modeling

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Scales of modeling





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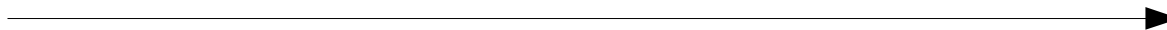
Methods in multiscale modeling using Zebulon



homogenisation methods (non - FE)



Microstructural FE model



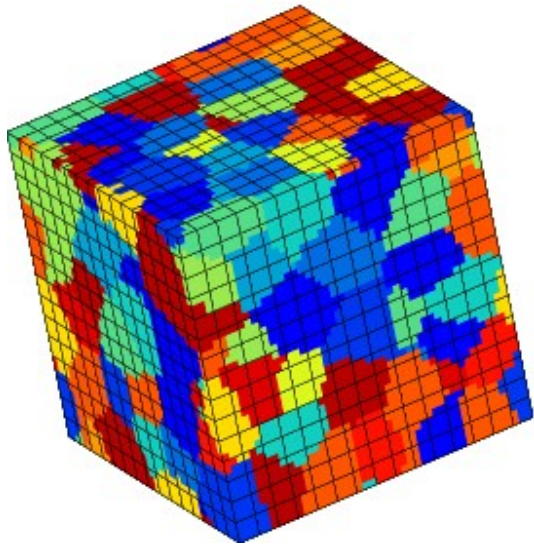
FE2 ... two scale FE material modeling



FE submodeling

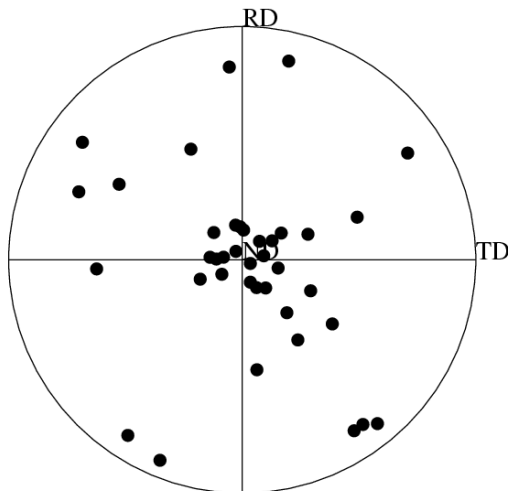


Example – microstructural FE model



FE mesh of a Representative Elementary Volume

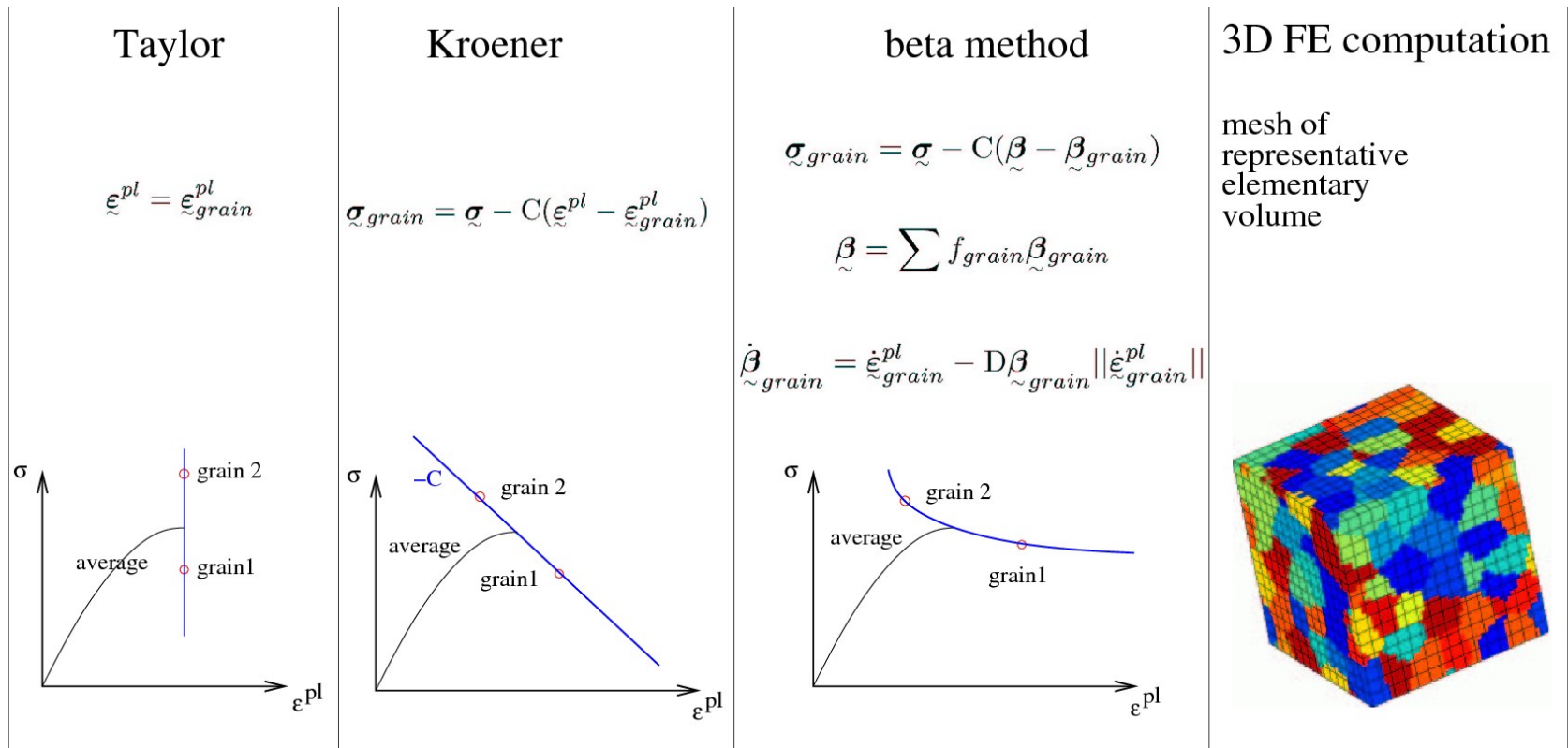
- Model of a metallic microstructure
- Crystal plasticity material model
- Grain geometry modeled by Voronoï polyhedra
- Boundary conditions: periodicity



Representation of material texture

- Pole figure of grain orientation
- Generated by statistical process
- Identified from texture measurements

Example – homogenisation models





What is it good for?

microstructural design

- Effect of texture on macroscopic material properties
- Effect of microstructure on fatigue properties
- design of composite materials (metal matrix composites, ...)
- ...

Less, well planned experiments

- **Faster material development at lower cost**