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Shape analysis for grains and pores on 3d digital images

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With our Software GeoDict® [1] we are able to segment 3d scans, e.g. CT or FIB-SEM scans. This segmented data can then be analyzed using GeoDict's new modules GrainFind and PoreFind. In this talk, we introduce GeoDict and present the features of these two modules.

For each individual pore, PoreFind extracts an equivalent ellipsoid from the segmented data. From the equivalent ellipsoids, we get the statistics of pore positions, pore orientations, and size distributions. Another property is the sphericity of the pore. These statistics can be used to provide parameters for engineering models as needed in [2], for example, to predict properties of rocks.

For each individual grain, GrainFind extracts an equivalent ellipsoid from the segmented data. From the equivalent ellipsoids, we get the statistics of grain positions, grain orientations, and size distributions. Another property is the sphericity of the grain. From these statistics, one can create a virtual twin of the scan, i.e. one has a computer model that allows the creation of voxelized 3d grain models with the same statistics. Furthermore, with GeoDict, this virtual twin can be used as a starting point such that it may better fit to those physical properties you want to optimize. One such property, for example, is the tortuosity of electrode materials as considered in [3].

References

[1] www.geodict.com.

[2] 3D experimental investigation of velocity-permeability controlling factors in carbonates rocks. Nathaly L. Archilha, Roseane M. Missagia*, Cathy Hollis, Marco A. R. de Ceia, Samuel A. McDonald, Irineu A. Lima Neto, David S. Eastwood, and Peter Lee. SEG Technical Program Expanded Abstracts 2015. August 2015, 3000-3004.

[3] Stenzel, O., Pecho, O., Holzer, L., Neumann, M. and Schmidt, V. (2017), Big data for microstructure-property relationships: A case study of predicting effective conductivities. AIChE J., 63: 4224–4232. doi:10.1002/aic.15757

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