Investigation of Geometrical Descriptors for the 3D Pore Shape Classification in Reservoir Rocks

Mayka Schmitt[1], Celso Peres Fernandes[1], Matthias Halisch[2], and Cornelia Müller[2]

[1]Federal University of Santa Catarina
[2]Leibniz Institute for Applied Geophysics (LIAG)

Abstract

This work focuses of the characterization of 3D pore descriptors in reservoir rocks and how spatial parameters are organized to trait macro behaviors on the rock-rock-fluid system. With the availability of high-resolution X-ray Micro Computer Tomography the ability of detailed particle shape quantification arises. To better describe and quantify the irregular particles/pores shape in sedimentary rocks, distinct pore classification from the literature were investigated and applied. Prior to the classification, however, a methodology for identifying 3D particles was developed and distinct 3D particle descriptors (length, width, and thickness) were compared for a more suitable shape classification, involving artificial objects similarity discussed based on the main pore-networks detachment with morphology preservation. The results were validated for three sandstones originating from three reservoirs having very distinct geological ages. In these rocks the predominant shapes were mainly plate and cube -like ranging from 39.49 to 50.94 % and 58.80 to 45.18 % when the Feret caliper descriptor in a 10003 voxels volume was applied. This study points out the possibility of quantifying the shapes of very irregular particles from any material system involving 3D images analysis.