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Using Definiens eCognition and Arcgis programs in determination of reservoir properties

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The main task of this work is to study a configuration of porous space into oil contained carbonate rocks, using German software “Definiens eCognition” and ArcGis, based on investigation and analysis of micro photos of grinding rock plate. More than 100 thin sections were made of even-aged carbonate deposits at girding machine. The mineral context, textural relationship and rock matrix were studied with microscope. All the rock’s examples were taken from the same oil field in the Tatarstan Republic, Russia.
The micro photos were made with a system of polarization microscope and digital camera, in natural light (parallel nichols) and in polarized light (cross nichols). Photography computing technology comprises united rule set for the micro photos in parallel nichols.
The first step was to create a chess board segmentation. Every pixel has certain meaning of color spectrum. White pixels are classified and are merged to “porous” class. Other pixels present “background” class.
Secondly, the smallest pores were classified as “background”, because they do not satisfy the condition of the minimal pore area. Analogically, all enclosed objects in class “porous” reclassified to “background”. Thus, it was done a filtration.
After that, a new class was distinguished: “oil”. The class “background” was divided into pixels by chess board segmentation. Some black range pixels joined to class “oil”, the other part of the pixels were reclassified into “carbonates” and were merged.
Thus, 3 classes of objects were made. Pixel areas were automatically calculated for all the classes. Using these data, we calculated a porosity of rocks by formula: area of pores/all area.
The next step was to export the polygons to shape file and to open in ArcGis software, where the statistical geometrical characteristics was continued.
At the end of the work, the algorithm of porous space analysis for micro photo of carbonate slides was created. A new data of effective porosity was compared to laboratory results.
The comparison showed the possibility of creating express methods to value the porous space in reservoir rocks of oil and pitch. It should be also noticed, that this approach is very popular abroad and it is poorly developed in Russia.