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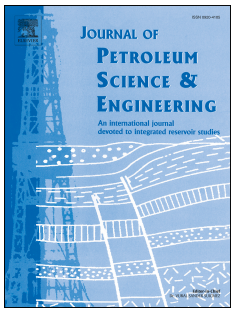

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Prediction of shell content from thin sections using hybrid image process techniques

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Abstract

Shell content is an important indicator to evaluate the accumulation capability of carbonate reservoirs, but still needs to be estimated artificially. As such, some techniques that can automatically predict shell content only from stained thin section image are proposed. The processing procedures of those techniques include four steps: binarizing color thin section image; detecting edges of objects; using a special technique to extract shell areas; finally adjusting appearances of those extracted shells by dilating and eroding. Six thin sections used for validating techniques derive from the Lower Jurassic formations of the Sichuan Basin. For these six validated cases, the error between the expected and calculated shell content is 0.51%, 2.59%, 0.93%, 2.31%, 2.14% and 2.75% respectively. Moreover, within each thin section image, the main lithology predicted in accordance with the calculated shell content is consistent with that deduced from the expected shell content. The small errors and exact judgments of the lithology manifest that the proposed techniques are capable to provide the reliable shell content data, and compared to the conventional observation and analysis methods they are cost-efficient when dealing with a large amount of thin section images. Therefore, the proposed techniques have practical value and can be used as the handy tool for geologists in the work of observing and identifying thin section.

Keywords: carbonate formation evaluation; thin section; shell content; median filtering; binarization; edge detection

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