



A lithological segmentation from well logs using the Hölderian regularity analysis combined with the gray system theory. A case study from an Algerian tight reservoir

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Here, the regularity analysis consists of studying the evolution of the Hölder exponent value (H) of the investigated well logs with depth, and establishing a possible relationship between the H value and the physical nature of the measured parameter.

This research attempts to improve the accuracy of the Hölderian regularity estimation of well logs using the gray system theory (GST).

First, simulated logs data are created using different types of Hölder functions. The application on these synthetic logs demonstrates that the Hölder functions estimated from the logs processed by the GST are more accurate than those computed from the raw logs.

Second, the suggested technique is applied on well log data recorded in a tight reservoir at an Algerian borehole. It is shown that the regularity obtained from the velocity sonic logs processed by the GST is more reliable than that inferred from the raw data. Furthermore, the estimated Hölder profiles reveal almost all the lithological discontinuities encountered by the well. To conclude, the GST is a powerful tool for enhancing the estimation of the Hölderian regularity of well logs, and thus performing an accurate lithological segmentation.

Keywords: Well logs, Hölder exponent, fractal, gray system theory.