



A new regularity-based algorithm for characterizing heterogeneities from digitized core image

Said Gaci (1), Naima Zaourar (2), and Olga Hachay (3)

(1) Sonatrach- Division Exploration, IAP Bâtiment C, Avenue 1er Novembre, Boumerdes 35000, Algeria, (2) Department of Geophysics— FSTGAT, University of Sciences and Technology Houari Boumediene (USTHB), BP 32 El Alia, 16111, Algiers, Algeria, (3) Institute of Geophysics, Ural Branch of Russian Academy of Sciences, Amundsen str. 100, Yekaterinburg 620016, Russia.

The two-dimensional multifractional Brownian motion (2D-mBm) is receiving an increasing interest in image processing. However, one difficulty inherent to this fractal model is the estimation of its local Hölderian regularity function.

In this paper, we suggest a new estimator of the local Hölder exponent of 2D-mBm paths. The suggested algorithm has been first tested on synthetic 2D-mBm paths, then implemented on digitized image data of a core extracted from an Algerian borehole. The obtained regularity map shows a clear correlation with the geological features observed on the investigated core. These lithological discontinuities are reflected by local variations of the Hölder exponent value. However, no clear relationship can be drawn between regularity and digitized data.

To conclude, the suggested algorithm may be a powerful tool for exploring heterogeneities from core images using the regularity exponents.

Keywords: core image, two-dimensional multifractional Brownian motion, fractal, regularity.