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Seismo radial grain velocity fractal dimension for characterizing Shajara reservoirs of the Permo-Carboniferous Shajara Formation, Saudi Arabia

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The quality and assessment of a reservoir can be documented in detail by the application of seismo radial grain velocity. This research aims to calculate fractal dimension from the relationship among Seismo radial grain velocity, maximum seismo radial grain velocity and wetting phase saturation and to approve it by the fractal dimension derived from the relationship among capillary pressure and wetting phase saturation. Two equations for calculating the fractal dimensions have been employed. The first one describes the functional relationship between wetting phase saturation, seismo radial grain velocity, maximum seismo radial grain velocity and fractal dimension. The second equation implies to the wetting phase saturation as a function of capillary pressure and the fractal dimension.

Two procedures for obtaining the fractal dimension have been utilized. The first procedure was done by plotting the logarithm of the ratio between Seismo radial grain velocity and maximum Seismo radial grain velocity versus logarithm wetting phase saturation. The slope of the first procedure = $3 - D_f$ (fractal dimension). The second procedure for obtaining the fractal dimension was determined by plotting the logarithm of capillary pressure versus the logarithm of wetting phase saturation. The slope of the second procedure = $D_f - 3$. On the basis of the obtained results of the fabricated stratigraphic column and the attained values of the fractal dimension, the sandstones of the Shajara reservoirs of the Shajara Formation were divided here into three units.

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