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Impacts of anisotropy of the fossil content on the electric behaviour and anisotropy of the highly fossiliferous limestone of Samalut Formation, Egypt: A case study

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Abstract

The Eocene Lutetian Samalut Formation is one of the best examples of anisotropic fossiliferous rocks in Egypt, where the effect of the anisotropic Nummulite gizehensis on the petrophysical behavior can be traced. Samalut Formation has been samples and studied in Sw Sinai at Wadi Feiran. Petrographically it is composed of two microfacies; namely they are nummulitic packstone and fusulinid mudstone microfacies. Cementation by micro to pseudo sparite, aggrading neomorphism and compaction due to load pressure are the most important porosity-reducing factors.

Petrophysically, both microfacies are characterized by negligible to poor porosity ($\varnothing \leq 7.0$ %) and relatively high to very high formation resistivity factor. The studied samples are characterized by relatively fair to medium electric anisotropism ' λ_E ' contributed by relatively medium to fair degree of electric foliation ' F_E '. The fossils anistropism ' λ_F ' ($1.5 \leq \lambda_F \leq 3.5$) is the main contributor for the petrophysical anisotropism ($2.0 \leq \lambda_E \leq 4.2$). Foliation of the studied microfacies is mostly due to re-orientation of the fossil particles parallel to the bedding plain. The anisotropism degree is relatively higher for the nummulitic packstone microfacies than that of the fusulinid mudstone microfacies.

Key words: Fossil anisotropism, electric anisotropism, formation resistivity factor, Samalut Formation, Sinai, Egypt.

