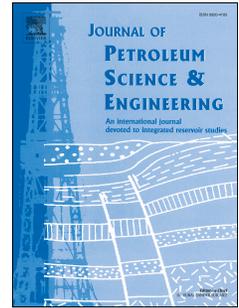


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A new technique for electrical rock typing and estimation of cementation factor in carbonate rocks

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1 A New Technique for Electrical Rock Typing and Estimation of Cementation Factor 2 in Carbonate Rocks

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6 Abstract

7 Natural heterogeneity of carbonate rocks causes difficulties in estimation of their petrophysical
8 properties such as cementation factor. These problems are mainly caused by complex pore
9 structure of carbonate rocks and presence of various types of pore in them. Generally, when
10 analyzed versus porosity, formation resistivity factor (F) data are highly scattered in carbonate
11 reservoirs. Several methods have been reported in literature to decrease such data scattering such
12 as data classification by permeability, pore types and reservoir rock types. However, outcomes
13 of these techniques have exhibited still some degree of the data scattering. Besides, many
14 correlations have been developed to relate cementation factor to porosity such as Borai's and
15 Shell correlations. Indeed, these correlations take into account the porosity rather than further
16 considering rock quality in terms of electrical conductivity.

17 In this paper, Electrical Quality Index (EQI) is proposed as a new parameter for classification of
18 F data in an attempt to improve estimation of cementation factor. Rock samples with similar
19 EQIs have similar electrical behavior. In other words, EQI can be used to group rock samples
20 into distinctive groups with specific equations of formation resistivity and cementation factors
21 versus porosity. The proposed technique was applied to the 112 carbonate rock samples reported
22 in Ragland's work. EQI divided these samples into 9 groups which have different equations of F
23 versus porosity with high values of determination coefficients. Also, cementation factor versus
24 porosity plots showed linear trends with high determination coefficients for all of the EQI
25 groups.

26 **Keywords:** Formation Resistivity Factor, Cementation Factor, Electrical Quality Index,
27 Tortuosity

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