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Explanation about the Earth Science which is Involved in Electro kinetics

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Abstract

Electro kinetic phenomena have been known for more than two centuries. Electro kinetic potential has been studied in relation to the field of colloid science and also in petroleum engineering research through its effects upon SP logging.

Keywords: Earth Science; Electro kinetics; Rock matrix; Hydrology

Introduction

Electro kinetics is used in earth sciences to provide insights concerning near-surface earth structures (from a few hundred meters up to several thousand meters depth) that host interstitial fluids (water, ice, oil, and gas). Electro kinetic phenomena are induced by the relative motion between the fluid and the rock matrix and, therefore, can provide information about the fluids within the earth. Self-potentials have been measured in hydrology, in active volcanic areas, and in polluted environments [1]. Various methods based on electro kinetics, including self-potentials and seism electromagnetic conversion, have been applied to the management of hydraulic and hydrocarbon reservoirs, the resource prospecting in glaciated regions, the exploration for and monitoring of geothermal reservoirs, the characterization of fractured reservoirs, and so forth.

Electro kinetic phenomena have been known for more than two centuries. Electro kinetic potential has been studied in relation to the field of colloid science and also in petroleum engineering research through its effects upon SP logging. Instrumentation improvements have resulted in an increased number of field observations, giving rise to new theoretical insights, specifically Pride's theory which combines Biota's equations and Maxwell's equations, and the developments on the transfer functions between the electromagnetic field and the seismic field [2]. This also arise new interest in modelling studies and led to numerous other publications in these fields during the past few decades.

This special issue addresses both self-potential and seism electrical conversions. The themes include field observations, modelling at small- and large-scale experimental developments, and theoretical analysis. From thirteen submissions, eleven papers were selected for publication in the special issue. Two reviewers critiqued each paper, and the manuscripts were then revised appropriately. We also include a tutorial which presents the basic principles of the coupling between fluid and electrical flow under both steady and unsteady conditions as developed by Pride and a review of various applications such as geothermal reservoir characterization, as well as an explanation about the electric double layer [3]. Field observations of self-potential caused by flow in fractured reservoirs are observed SP on mountain slopes is examined, the self-potential induced by horizontal fluid flow.

Seismic wave propagation induces a relative movement between the fluid and the rock matrix, leading to electro kinetic effects. Electrical signals that might arise due to earthquakes [4]. The seism electric method could be extended in future decades using interferometry by cross-correlation and electro kinetic potential has been studied in relation to the field of colloid science and also in petroleum engineering research through its effects upon SP logging This also arise new interest in modelling.

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