



Tide-generated electrokinetic mechanism and its employment in geophysical applications

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We discuss an approach for estimating the elastic properties and permeability of geologic formations from the observations of the electric field measured inside the medium and at the earth's surface, which arises due to the earth tides through electrokinetic mechanism. 1-D and 2-D forward problem formulations in terms of pore pressure are given and their numerical solutions are obtained assuming Biot poroelasticity model. We analyze the behavior of the electric field and propose an approach to derive the elastic and permeability coefficients from its variations related to the lunar/solar tides.

Based on the theoretical and numerical models in consideration, a method is proposed for monitoring of elastic and petrophysical parameters (Biot modulus, Biot coefficient, permeability coefficient), based on measuring the electric field associated with the pore pressure gradient.