



Soil permeability profiling using multiple geophysical data

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We propose a new method to estimate permeability of soils with multiple geophysical data based on rock physics. The method uses the unconsolidated sand model in rock physics to identify the soil type with seismic velocity and resistivity. The grain size representing each soil type thus derived and porosity estimated from resistivity by the modified Archie's law are input to the Kozeny-Carman equation for estimating permeability of the soil. The proposed method is applied to S-wave velocity and resistivity profiles obtained in well logging in saturated diluvial soils and acquired on an earthen levee to estimate soil permeability profiles. Comparison of estimated permeability with actual measurements by the in-situ permeability tests and laboratory tests shows that permeability can be estimated in accuracy less than one order of magnitude. This result indicates that the proposed method is promising for permeability profiling of soils using geophysical data.