Prompt Estimation of Uniaxial Compressive Strength Based on Resistivity and Conductive Alertness of Frozen soil

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Resistivity and conductive alertness is an inherent attribute of frozen soil, and a new method to estimate the frozen soil uniaxial compressive strength quickly is developed based on the resistivity and conductive alertness. The mechanical behavior of the Qinghai-Tibet Railway subgrade filling under load is investigated, indoor frozen soil uniaxial compression tests are conducted with the silt clay of Qinghai-Tibet Railway subgrade filling at different temperatures, resistivity is monitored during the whole test process. In this way, the stress-strain-resistivity curve is obtained, and the influence of temperature on the resistivity and conductive alertness is discussed. Results show that the frozen soil shows the similar properties as a varistor under compressive condition; with the increasing of the compressive stress, the resistivity can be divided into three variation intervals: a reduction zone, a balance zone, and a sharp increasing zone. When the dry density and water content is 1.71g/cm^3 and 17.8% respectively, the original resistivity, maximum resistivity, and the largest tangent modulus of the frozen soil increase simultaneously with the temperature decreasing. The relationship between uniaxial compressive strength(q_u) and original resistivity of the frozen soil satisfies with the equation, a new method of frozen soil strength quickly estimation is proposed and owned wide prospects of engineering application in the future.

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