

عنوان مقاله:

The effects of temperature on mechanical properties of rocks

محل انتشار:

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خلاصه مقاله:

In a natural condition, temperature variations and phase transition of pore water are the two most effective factors on the mechanical properties of rocks. Instabilities occurred as a result of climate changes, highlight the importance of rock characteristics. This paper conducted a laboratory investigation to study the temperature-dependent mechanical behavior of rocks and to examine the quantity and quality of this relationship. In order to perform laboratory tests, a temperature-controlling apparatus was developed. Studies were conducted on 152 specimens of concrete and three types of rocks, including granite, red travertine, and walnut travertine. Then, the effect of temperature variations, from -30 to +30°C with 10°C intervals on the mechanical properties of the rocks, was studied. The results showed that temperature reduction, caused by pore water phase transition, improved the mechanical properties of the rocks. The maximum variation of the mean uniaxial compressive strength from +30°C to -30°C belonged to granite (40.1%), while the concrete specimen showed the minimum variation on the test results (33.7%). Red travertine (38.7%) and walnut travertine (34.2%) exhibited lower variations compared to granite. Also, the maximum variation in the mechanical behavior of rocks occurred between -10 and 0 °C. Additionally, variations in the mechanical properties of cracked rock samples were more than the rocks with spherical pore and the same porosity percent.

کلمات کلیدی:

temperature, Mechanical Behavior, Travertine, Granite, Concrete

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