

عنوان مقاله:

Determination of Hydraulic Jacking Mechanism and Maximum Allowable Grout Pressure during Grout Injection in Anisotropic Rocks

محل انتشار:

مجله معدن و محیط زیست، دوره 12، شماره 2 (سال: 1400)

تعداد صفحات اصل مقاله: 15

نویسندگان:

A. Majdi - School of Mining Engineering, College of Engineering, University of Tehran, Tehran, Iran

M. Yazdani - School of Mining Engineering, College of Engineering, University of Tehran, Tehran, Iran

خلاصه مقاله:

The hydraulic jacking refers to the process of crack growth of the pre-existing joints in the rock mass under grout pressure above the minimum in-situ stress. Thus it is essential to understand the resistance behavior of the joints and maximum grout pressure. This paper describes a novel method for determining the hydraulic jacking occurrence in anisotropic rock mass based on the principle of fracture mechanics. This method is established on three stage developments: developing an equation in order to calculate the equivalent stress intensity factor at the joint tip, determining the fracture toughness by employing the Brazilian disc test with a loading rate of 0.1 MPa/s on the rock cored samples, and assessing the stability of joints using the maximum tangential stress criterion. By comparing the joint stress intensity factor and fracture toughness in the direction of rock anisotropy, the joint stability is evaluated. Then the maximum allowable grout pressure is analytically formulated as a function of fracture toughness in order to avoid the unwanted deformations in the joints (i.e. jacking) during grouting. In order to validate the proposed method, the data obtained from the boreholes used to construct water curtain at the Sanandaj Azad Dam in phyllite rocks are analyzed. Finally, it is concluded that the growth and expansion of the joints due to the instability under grout pressure leads to an increased cement take and the occurrence of hydraulic jacking. In addition, the proposed equation for computing maximum allowable grout pressure provides an acceptable agreement with the existing empirical rules and the results of the field data.

کلمات کلیدی:

Hydraulic jacking, Anisotropic rock, Brazilian disc test, Maximum allowable grout pressure, Sanandaj Azad Dam

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1241092>

