Influence on the impact energy of rock drill

How does impact frequency affect rock-drilling efficiency?
The impact energy increases with the dynamic loading amplitude. The penetration rate at dynamic loading amplitude of 4 kN (0.13137 mm/s) is 38.7% higher than that of 2 kN (0.09473 mm/s). When the impact frequency is lower than 150 Hz,the rock-drilling efficiency increaseswith the impact frequency and dynamic loading amplitude.

Does rock-drilling efficiency increase with dynamic loading amplitude?
Then,a full-scale drilling experiment was conducted to study the rock-drilling efficiency. The results are as follows: the optimal frequency is higher than the resonance frequency of the rock. The impact energy increaseswith the dynamic loading amplitude.

Which impact energy should be applied during percussion drilling?
During percussion drilling,it is recommended to apply the maximum impact energy,while also considering the resistance of the drilling system and the wear of the buttons [Jiang et al.,2020; Aising et al.,2024a]. Fig. 16. (A) The volume,depth,and 3D morphology of craters under different impact energies [Modified after Aldannawy,2022].

How can percussion drilling improve rock fragmentation efficiency?
Such research is critical for developing advanced percussion drilling techniques that can maintain high efficiency even in extreme environments. Impact energycan significantly enhance the efficiency of rock fragmentation. While conical buttons with smaller curvatures perform well in hard rock,their durability is inferior to spherical buttons.

Why is rock mechanical response important during percussion drilling?
The rock mechanical response during percussion drilling is crucial for optimizing process parameters. Existing models,such as bilinear,multilinear,and power-law models,describe the f-p relationship but are largely based on single-impact tests.

Does in-situ pressure affect rock fracture during percussion drilling?
While a large body of literature has examined the impact of percussion parameters under atmospheric pressure,only a few studieshave investigated the effect of in-situ pressures on rock fracture during percussion drilling [Gerbaud et al.,2024].

In response to the issues of overheating of the shell and insufficient impact energy of the hydraulic rock drill, this paper focuses on the ...

The 1D model approximates the dynamics underlying the drill-ing process by assuming that the impact of the

hammer generates a longitudinal wave in the bit. It is shown that the BRI pseudo ...

To optimize and improve the impact performance of a hydraulic rock drill, it is helpful to test the stress waves of the drill and analyze the impact energy, ...

Rotary-percussion drilling technology was used to improve drilling efficiency in marine deep hard rock formations, but the compatibility among the engineering & tool ...

This paper presents the results of a laboratory study aimed at assessing the influence of indexation (the ratio of the bit angular velocity over the activation frequency) and ...

nical properties play an important role in drilling operations such as fracture zone prediction and well stability. According to Kahraman et al., the significant rock properties that influence the ...

Request PDF | Influence of indexation and impact energy on bit/rock interface law in percussive drilling: an experimental study | This paper presents the results of a laboratory ...

When the drilling fluid acts on the rock layer through the bit, a certain impact force is generated, and displacement Q is a constant value when calculating hydraulic rock-breaking ...

This paper focuses on experimental and numerical investigations on percussive drilling. An experimental setup, using a single bit button, was developed to carry out dynamic ...

Percussive drilling is a highly effective excavation technique suited for hard rock formations. The method utilizes impact-induced stress waves, which drive a drill bit ...

o The relationship between drilling power, load energy consumption, and load energy efficiency is explored. o The influence of drilling rig working parameters on drilling ...

Then, the velocity curve of impact piston was obtained after judging the striking point through the feature of rear-chamber"s pressure spike, so were the rock drill"s impact energy, ...

Under the drilling parameters of a 22 mm double-spherical tooth with an impact energy of 35 J and a drilling pressure of 1.4 kN, the optimal ...

To further explore and improve the high-efficiency rock-breaking mechanism of rotary-impact drilling technology, this paper first innovatively carried out a rock drillability ...

Finally, the field applications of compound percussive drilling were conducted. Matching higher impact frequency under low-speed conditions and ...

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The longitudinal acoustic wave velocities were measured before testing. The rock specimens were grouped according to the method of drilling the central hole (impact load exerted by ...

The high-efficiency impact rock fragmentation orthogonal experiment is conducted to analyse the influence of working parameters, including impact power, propulsion force, ...

Abstract As a technological innovation of high-power hydraulic rock drill, double damping system has a very important effect on impact performance. The double damping ...

With the scale of mining and the large-scale tunneling, high frequency and high power have become an important development direction of hydraulic rock ...

To optimize and improve the impact performance of a hydraulic rock drill, it is helpful to test the stress waves of the drill and analyze the impact energy, impact frequency, ...

At a certain drilling depth, with the excitation frequencies as the control parameters, the maximum impact force and rock breaking energy ...

Keywords Abstract Rock properties, Drill penetration rate, Index rotation energy, Rock drilling, Rock properties. roper selection of the bit and speed of rotation of the drill for fast penetration ...

Abstract. Percussive drilling is suitable for the fragmentation of rocks and other similar materials with hard and brittle properties. Research on energy transfer efficiency is of ...

In response to the issues of overheating of the shell and insufficient impact energy of the hydraulic rock drill, this paper focuses on the hydraulic rock drill ...

The longitudinal acoustic wave velocities were measured before testing. The rock specimens were grouped according to the method of drilling the central hole ...

It is shown that a drill bit with a combination of conical and spherical inserts is more efficient with respect to rock removal when compared to a drill bit made of only spherical inserts. The study ...

Study shows that the specific shape of impact load can use a certain proportion of its impact energy to break rock, which indicate the impact load shape of percussive drilling tool ...

This paper presents the results of a laboratory study aimed at assessing the influence of indexation (the ratio of the bit angular velocity over ...

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In this paper, the influences of impact parameters including impact frequency, dynamic loading amplitude, and loading on impact energy were analyzed by a theoretical ...

Regarding rock breaking efficiency, the impact velocity has a relatively minor influence, while the drill rod diameter shows a positive correlation with efficiency. The drill bit ...

During the percussive drilling process, the hammering system converts the potential energy of the pressurized air or water into reciprocating movements of the hammer, ...

To optimize and improve the impact performance of a hydraulic rock drill, it is helpful to test the stress waves of the drill and analyze the impact energy, impact frequency, and energy ...

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