

# Elastic energy storage coefficient

If a material is loaded elastically to a stress  $s$ , the stored elastic energy per unit volume is: Another measure of damping is the logarithmic decrement  $d$  which is the log of the ratio of successive amplitudes of natural vibration of the solid.

To do it, though, you need to perform some work - or, in other words, to provide it with some energy. This energy is then stored in the spring and released when it comes back to its equilibrium state (the initial shape and ...

Furthermore, the elastic strain energy and dissipated strain energy have linear relationships with the input strain energy. Through analyzing coefficients of variation of common parameters, it was found that the energy storage capacity of rock was not sensitive to the specimen size, and therefore, the energy storage coefficient could be ...

The ratio of elastic energy density to the total input energy density is defined as the energy storage coefficient. The energy storage coefficient is expressed as a percentage ...

The energy storage coefficient of compression reflects the storage capacity of elastic energy of the sandstone-concrete sample. The larger the energy storage coefficient, the greater the ability to store elastic energy.

The understanding of elastic energy in spring systems has numerous practical applications in various fields, including: Mechanical Devices: Springs are widely used in mechanical devices, such as shock absorbers, car suspensions, and precision instruments, where the storage and release of elastic energy play a crucial role in their functionality.

Storage of elastic energy is key to increasing the efficiency, speed, and power output of many biological systems. This paper describes a simple design strategy for the rapid fabrication of ...

The ratio of the elastic energy density to dissipated energy density with increasing input energy density was investigated using a new method, and the results show that this ratio tends to be constant at the peak compressive strength of rock specimens. ... (1-a) can be regarded as the compression energy storage coefficient and the compression ...

Two indicators-the elastic strain energy storage coefficient and energy release coefficient-are proposed based on the energy evolution characteristics of different stages during rock bursts ...

The energy storage coefficient in triaxial compression of the rock was positively correlated with the confining pressure, whereas the corresponding energy dissipation coefficient exhibited an opposite correlation. ... Using the linear energy storage law, the peak elastic strain energy and peak dissipated strain energy of rock in triaxial

...

1 &#0183; Benefitting from these properties, the assembled all-solid-state energy storage device provides high stretchability of up to 150% strain and a capacity of 0.42 mAh cm<sup>-3</sup> at a high ...

In order to characterize the energy storage performance of rock materials, the energy storage coefficient (ESC) is proposed based on the linear storage energy law, which is defined as A in Eq. (6) . The greater the value of ESC is, the higher the capability of elastic strain energy storage is.

The degradation of the thermo-poro-elastic strain energy is achieved through micromechanically derived Biot's coefficient, and its degradation depends on the phase-field (damage) and the energy decomposition scheme. Then, we propose a new way to update the porosity that only depends on the strain change rather than the damage.

The energy storage coefficient in triaxial compression of the rock was positively correlated with the confining pressure, whereas the corresponding energy dissipation coefficient exhibited an opposite correlation.

Having a high energy storage coefficient can solve the problem related to the increase in the unloading time of the testing machine that occurs when the rock sample is at ...

This indicates that the energy storage coefficient is affected by loading modes and that stress path II is more favorable for storing elastic energy. The larger the energy storage coefficient (%) is, the stronger the storage capacity of elastic energy and the more elastic energy storage; otherwise, less elastic energy is stored.

These two coefficients are actually equivalent to the slope (c or 1 - c) of the fitting curve between the internal elastic energy (or the internal dissipation energy) and the external input energy, where the external input energy serves as the abscissa, and the internal elastic energy or internal dissipation energy is the ordinate. The SESC ...

The peak elastic strain energy consumption ratio (PEECR) is a rock brittleness index proposed by Gong and Wang. In the present study, based on the linear energy storage law of rock under triaxial compression, a new method was proposed to calculate the PEECR.

The energy dissipation coefficient (A<sub>D</sub>) was proposed by referring to the definition of the compression energy storage coefficient. The compression energy storage coefficients of concrete at 3 d, 7 d, 15 d, and 28 d were 0.1515, 0.1628, 0.2603, and 0.4636, respectively. With increasing age, the compression energy storage coefficient increased.

Using the linear energy storage law, the peak elastic strain energy and peak dissipated strain energy of rock in triaxial compression were deduced. Furthermore, the ...

Gong FQ, Yan JY, Li XB (2018) A new criterion of rock burst proneness based on the linear energy storage law and the residual elastic energy index. Chin J Rock Mech Eng 37(9):1993-2014 ... Hong ZJ (2019) Revised energy drop coefficient based on energy characteristics in whole process of rock failure. Rock Soil Mech 40(1):91-98. Google Scholar

The ratio of elastic energy density to total input energy density can be defined as the energy storage coefficient. Note that the coefficient refers to the ratio of the elastic energy density at different unloading levels to the total input energy density under the peak intensity, which is different from the ratio of the elastic energy density ...

Elastic energy storage devices store mechanic work input and release the stored energy to drive external loads. Elastic energy storage has the advantages of simple structural principle, high reliability, renewability, high-efficiency, and non-pollution [16], [17], [18]. Thus, it is easy to implement energy transfer in space and time through ...

Based on the linear energy storage law, the peak elastic strain energy of each granite specimen can be accurately obtained. ... The flexural energy storage coefficient and flexural energy ...

Using the linear energy storage law in different directions, the elastic energy density in various directions (axial elastic energy density, lateral elastic energy density and ...

(d) Maximum stress and the Young's modulus of the CAS in the cycle test. (e) Energy loss coefficient and height retention of the CAS in the cycle test. (f) Storage modulus, loss modulus, and loss factor of the CAS in the DMA test. (g) Energy loss coefficient of CAS and other previously reported elastic materials.

Note that the above results are consistent with the evaluation results of the relative energy storage capacity based on the compression energy storage coefficient  $a$  and tension energy storage coefficient  $c$  (Fig. 6). The three parameters ( $W_{et}$ ,  $p$ ,  $a$  and  $c$ ) are all dimensionless, and they can only evaluate the relative energy storage capacity of ...

elastic energy stores: their stiffness, which determines the magnitude of the energy that can be stored; their resilience, which determines the fraction of the invested energy that is returned; ...

The  $a$  after the stress peak is - 0.349, - 0.451, respectively, indicating that the energy storage capacity of the combined body is weak after the stress peak, which is the stage of releasing elastic energy.

The ratio of elastic energy density to the total input energy density is defined as the energy storage coefficient. The energy storage coefficient is expressed as a percentage and represents the capability of coal and rock to store elastic energy.

2.2.3. Elastic Strain Energy Storage Coefficient and Elastic Strain Energy Release Coefficient . The capability

## Elastic energy storage coefficient

of a coal rock mass to store elastic strain energy can be measured by the elastic strain energy storage coefficient (ESESC), defined as the ratio of the elastic strain energy stored when the stress attains its peak to the strain at ...

directions was founded. Using the linear energy storage law in different directions, the elastic energy density in various directions (axial elastic energy density, lateral elastic energy density and total elastic energy density) of granite under any specific confining pressures can be calculated.

The larger the energy storage coefficient is, the greater the compressive strength. The hole arrangement angle shows a stronger effect on energy storage coefficient and compressive strength than the number of holes. ... that is, the higher energy storage coefficient, the more elastic energy stored in the rock specimen and the greater failure ...

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