

Elastic strain energy storage

Can elastic energy storage be based on internal strains?

While energy storage is considered one of the most pressing areas of technological development, hardly any research addresses elastic energy storage based on internal strains.

Why is elastic energy storage important?

Such phenomena may result in strain misfits that generate internal stresses that store elastic energies, which turn out to be extremely useful for enabling functions such as shape change, locomotion, or predation. However, the significance of elastic energy storage has received little attention.

What are the functions of elastic storage device using spiral spring?

The principal functions of elastic storage device using spiral spring are energy storage and transfer in space and time. Elastic energy storage using spiral spring can realize the balance between energy supply and demand in many applications.

What is peak-strength strain energy storage index?

To solve the problem above, the peak-strength strain energy storage index ($W_{e t p}$) is introduced in this study, which is determined as the ratio of the elastic strain energy density to the dissipated strain energy density at the peak strength of rock specimen.

What is the relationship between elastic strain energy density and energy density?

Based on the linear relationships between the elastic strain energy density and the total input energy density under different unloading stress levels, a method for calculating the elastic strain energy density and the dissipated strain energy density at the peak strength of rock specimen is proposed, and $W_{e t p}$ can then be obtained.

How to obtain strain energy storage index of rock materials at peak strength?

To obtain the strain energy storage index $W_{e t p}$ of rock materials at peak strength, a series of uniaxial compression and single cyclic loading-unloading uniaxial compression tests were designed and conducted on nine rock materials. Based on the experimental results, the following conclusions can be drawn:

Whether this dissociation between tendon morphological and mechanical features pertains to energy storage capacity is unknown. The present article addresses the question of the ...

In this paper, a new insight into the elastic-plastic crack extension is proposed on the foundation of critical storage of elastic strain energy (SESE). The feasibility of the new ...

The ability to store and return elastic strain energy may also provide metabolic savings over an evolutionary timescale by enabling advantageous changes to morphology and ...

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In the presence of biological springs, these energy fluctuations can be accommodated by the storage and return of elastic strain energy, so reducing the muscle work required.

The elastic strain energy recoil of the AT during the propulsion phase of walking and running is a well-known mechanism within the muscle-tendon unit, which increases the ...

Strain engineering has been a critical aspect of device design in semiconductor manufacturing for the past decade, but remains relatively ...

We found that all the elastic tissues delivered nearly the same amount of energy to the skeleton during a CMJ and an SJ. The reason is twofold: first, nearly as much elastic ...

Storage of strain energy in elastic materials has important roles in mammal running, insect jumping and insect flight. The elastic materials involved include muscle in every case, but only ...

This storage and release of elastic strain energy has profound implications for both human engineering and for animal function. For human-engineering, think of sling-shot.

This index is stable and can better reflect the relative magnitudes of the stored energy and the dissipated energy of rocks at the whole pre-peak stage than the strain energy ...

The results indicated that under different confining pressures, both the pre-peak elastic strain energy and pre-peak dissipated strain energy were linearly related to the pre ...

Deep rock masses are typically in complex stress states, and research on the evolution of their strain energy density is of highly important for understanding their failure ...

This equation can be used to calculate the energy storage capacity of muscle springs for a given strain, using an estimate of tangent elastic modulus (use of ...

Before the peak stress, the total energy input is proportional to the accumulated elastic strain energy, with the energy storage coefficient decreasing as heat treatment ...

Modulus of resilience, the measure of a material's ability to store and release elastic strain energy, is critical for realizing advanced mechanical actuation technologies in ...

Whether this dissociation between tendon morphological and mechanical features pertains to energy storage capacity is unknown. The present article addresses ...

The concepts of relative energy storage potential and ultimate energy storage potential were proposed to

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evaluate the energy storage performance of the two shaped ...

The total strain energy and total elastic energy of the different hard rocks increase with increasing σ_2 or σ_3 values at pre-peak, whereas the total dissipated strain ...

The results showed a linear relationship between the elastic strain energy density and input energy density, which confirms the linear energy storage law of coal. Based on this ...

High-enthalpy elastic metamaterials constructed from freely rotatable chiral metacells have high stiffness, large recoverable strain and improved buckling strength.

Based on energy storage and transfer in space and time, elastic energy storage using spiral spring can realize the balance between energy supply and demand in many ...

Through analyzing the relationship between the elastic strain, plastic work, and temperature rise, the ratio of energy storage to heat dissipation under shock compression are ...

In the biological world, materials are often heterogeneous and anisotropic, comprising components with very different elastic properties. The resulting structures are ...

Soft elastomeric composite materials constituting of an elastomeric matrix with dilute concentrations of thin, relatively higher modulus interfacial layers are presented and ...

According to the relationship obtained from the test, the elastic strain energy at the peak stress time can be obtained; (5) A new criterion for assessing rock burst proneness is ...

Monkeys are "flat-footed" in comparison to humans, but they are still able to utilize elastic strain energy stores in their feet to reduce the metabolic energy cost of running. During contact with th...

Storage and utilization of elastic energy in skeletal muscle. Cavagna GA Exerc Sport Sci Rev, 5:89-129, 01 Jan 1977 Cited by: 69 articles | PMID: 99306 Review Claim to ORCID Get citation

Such "elastic energy batteries" provide efficient performance and evolutionarily adapted functionality through a smart, structure-based energy management.

Strain energy parameters were calculated from the test curves. The results show that there is a linear relationship between the elastic strain energy and input strain energy, ...

Quantitative Description Muscle and tendon energy storage represents the strain energy that is stored within a muscle-tendon complex as a muscle and tendon are stretched by ...

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An elastic energy storage device using a spiral spring has been designed for lifting machinery. The gravitational potential energy of the load weight can be converted into ...

Storage and utilization of elastic strain energy during human jumping: an analysis based on the predictions of an experimentally verified optimal control model E. ...

Elastic elements are among the earliest utilized energy storage techniques in history. Strings in bows and elastic materials in catapults were used to control energy storage ...

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