

What is a solid-state Marx circuit using inductive energy storage?

In this article, we propose a solid-state Marx circuit using inductive energy storage, where inductors play the role of principal energy storage element. When combined with an opening switch, the inductor can generate an output voltage of dI/dt , where I is the inductor current.

Can software tools be used for valuing energy storage?

Taking advantages of the knowledge established in the academic literature and the expertise from the field, there are efforts from multiple parties (e.g., national laboratories, utilities, and system integrators) in developing software tools that can be used for valuing energy storage.

What are energy storage systems?

Energy storage systems (ESSs) can alleviate the problems associated with renewable energy power generation technology. Electrical energy storage systems (EESSs) enable the transformation of electrical energy into other forms of energy, allowing electricity to be stored and reused when needed.

How can energy storage improve the operation of the electricity network?

Multiple requests from the same IP address are counted as one view. The operation of the electricity network has grown more complex due to the increased adoption of renewable energy resources, such as wind and solar power. Using energy storage technology can improve the stability and quality of the power grid.

Are energy storage systems interoperable?

Furthermore, as the application space of energy storage grows very quickly across the entire grid from generation, transmission, distribution to load, the tools are also required to analyze ESSs' interoperability across different spaces (e.g., ESSs that are located in distribution systems but provide transmission services).

Does energy storage need a dynamic simulation tool?

For energy storage applications focused on improving the dynamic performance of the grid, an electromechanical dynamic simulation tool is required to properly size and locate the energy storage so that it meets the desired technical performance specifications.

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Abstract: The all-solid-state inductive energy storage pulse forming line modulator is a brand-new solution to achieve a high repetition rate, high voltage gain, and short pulse output. However, due to the non-ideal dynamic characteristics of the switch and the fixed physical space size of the transmission line, it's difficult to realize the generation and control of high-voltage short pulses.

Stretch meat grinder [1] is one of the most typical topologies of the inductive energy storage pulse power supply belongs to the Institute for Advanced Technology (IAT) [2]. Figure 1 shows the topology of the STRETCH meat grinder. In the STRETCH meat grinder circuit topology, two highly coupled inductance coils L_1 and L_2 are composed of multiple ...

2.3 BESS SOFTWARE Critical for ongoing safety and system performance, software and digital controls help BESS operators monitor and manage the movement of electricity throughout a battery energy storage system. By using intelligent, data-driven, and fast-acting software, BESS can be optimized for power

For the conventional method of direct transfer of energy between a storage inductor and an uncoupled load inductor, the maximum energy which can be transferred to the load inductor is 25% of the initial stored energy. The Meatgrinder, a novel inductive energy storage and transfer circuit, has been shown to approach 100% energy transfer ...

By using the technology of energy storage inductor and electro-exploding wire opening switch (EEOS) driven by pulsed capacitors, we studied the inductive-energy-storage pulsed power source. Based on the researches of EEOS with different material, different parameters and different quench medium, an excellent opening switch has been developed. On the basis of ...

Inductive energy storage is attractive because it has both a high energy storage density and a fast discharge capability. By producing a pulse train with a peak power of 75 MW at a pulse repetition rate of 5 kpps in a one-ohm load system, this research program was the first to demonstrate fully-controlled, high-power, high-repetition-rate ...

@article{osti_5273936, title = {Closing/opening switch for inductive energy storage applications}, author = {Dougal, R A and Morris, G Jr}, abstractNote = {This paper reports on a magnetically delayed vacuum switch operating sequentially in a closing mode and then in an opening mode which enables the design of a compact electron-beam generator based on an ...

Scaling-up the low-energy generator proved however difficult and led to the successful development of a novel high-energy generator, based on inductive energy storage technology. The inductive energy storage technique was considered in the early 1960s in relation to high-energy plasma fusion projects.

There have already a lot of circuit topologies for pulsed power generators using semiconductor switches. In this article, a novel circuit topology concept that can generate bipolar pulses based on linear transformer driver (LTD) topology is presented. Different from traditionally capacitive energy storage (CES) method, we utilize magnetic core as inductive energy storage ...

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Solid-state Marx generator circuits have been widely studied in recent years. Most of them are based on capacitive energy storage (CES), with the basic principle of charging in parallel and discharging in series. In this article, we propose a solid-state Marx circuit using inductive energy storage, where inductors play the role of principal energy storage element. When combined ...

Extended Summary ? pp.549-554 -4- Effect of Pulse Width on Ozone Yield using Inductive Energy Storage System Pulsed Power Generator Ippei Yagi Student Member (Iwate University, t3308022@iwate-u.ac.jp) Seiji Mukaigawa Member (Iwate University, mukaigaw@iwate-u.ac.jp) Koichi Takaki Member (Iwate University, takaki@iwate-u.ac.jp) ...

The standard inductive energy storage system, Fig. 5, is used to supply power in the form of a large single pulse or a train of high power pulses. Energy is transferred from the inductive store to the load each time the opening switch operates, Fig. 6. Inductive energy storage systems are discussed in considerable detail in

An inductive energy storage pulse power system is being developed in BARC, India. Simple, compact, and robust opening switches, capable of generating hundreds of kV, are key elements in the development of inductive energy storage pulsed power sources. It employs an inductive energy storage and openi ...

A new type of vacuum arc thruster in combination with an innovative power processing unit (PPU) has been developed that promises to be a high efficiency (~15%), low mass (~100 g) propulsion system for micro- and nanosatellites. This thruster accelerates a plasma that consists almost exclusively of ions of the cathode material and has been operated ...

This paper is aimed at finding the effect of varying inductive energy storage systems" (IESSs) inductance on resistance of an electrically exploded conductor-based opening switch and profile of current transferred into load, which has not yet been fully understood. Based on experimental results obtained, it is observed that when the inductance of IESS is varied, the magnitude of ...

The wide range of problems associated with IS-systems (Inductor Storage System) has been investigated: storage system, magnets energy transfer network, etc. Different charging sources have been designed using synchronous generators, high-power thyristor converters, homopolar generators. Magnet systems were optimized for different requirements.

When designing the structure of the energy storage inductor, it is necessary to select the characteristic structural parameters of the energy storage inductor, and its spiral structure is usually ignored when simplifying the calculation, that is, the n-turn coil can be equivalent to N closed toroidal coils. Taking copper foil inductors as an example, the two ...

With the development of semiconductor switches in recent years, inductive energy storage has shown a good application potential in pulsed-power supplies. In our previous studies, a repetitive ...

DOI: 10.1016/J.ACTAASTRO.2021.06.008 Corpus ID: 236294501; Performance model of vacuum arc thruster with inductive energy storage circuit @article{Bai2021PerformanceMO, title={Performance model of vacuum arc thruster with inductive energy storage circuit}, author={Song Bai and Ning-fei Wang and Kan Xie and Long Miao and Qimeng Xia}, ...

Inductive Charging/Wireless Power. ... the development of battery management software or algorithms, and remote battery (system) diagnostics with regard to ageing, residual value, and lifetime prognosis. For our customers, we also offer testing of battery management systems using special test systems. ... The demand for energy storage has grown ...

Solid-state Marx generator circuits have been widely studied in recent years. Most of them are based on capacitive energy storage (CES), with the basic principle of charging in parallel and discharging in series. In this article, we propose a solid-state Marx circuit using inductive energy storage, where inductors play the role of principal energy storage element. ...

Energy storage capability is needed for proper power conditioning in systems where the duty factor of the output pulse train is low. Inductive energy storage is attractive because it has both a high energy storage density and a fast discharge capability. However, to transfer energy from a coil or inductor to a load, an opening switch must be ...

By adopting a simple inductive energy storage (IES) circuit [7] and the "triggerless" ignition method [8], the mass of the propulsion system can be decreased to less than 200 g, with a specific impulse of >1000 s and a power level ...

The all-solid-state inductive energy storage pulse forming line modulator is a brand-new solution to achieve a high repetition rate, high voltage gain, and short pulse output. However, due to the non-ideal dynamic characteristics of the switch and the fixed physical space size of the transmission line, it's difficult to realize the generation and control of high-voltage short pulses. ...

Pulsed power generation using solid-state linear transformer driver (LTD) with inductive energy storage has been experimentally studied. This is a feasibility study in order to explore this new approach by proving its operation principle and demonstrating its typical performance. Magnetic cores in LTD modules are used as intermediate energy storage from ...

Two methods of output voltage adding using pulse forming lines (PFLs) have been studied and compared. Both methods use inductive energy storage (IES) instead of traditional capacitive energy storage (CES), which means that the PFLs are charged by current instead of voltage. One of the methods (Type A) used an additional transmission-line-transformer (TLT) to achieve the ...

The purpose of an opening switch is simply to stop the flow of current in the circuit branch containing the

switch and to accomplish current interruption, the opening switch must force the current to transfer from the switch to a parallel circuit branch and then withstand the voltage generated by the current flowing through the load. The purpose of an opening switch is simply ...

Considering the above requirements, there are several basic concepts that can be used for high-voltage pulse generation. The key idea is that energy is collected from some primary energy source of low voltage, stored temporarily in a relatively long time and then rapidly released from storage and converted in high-voltage pulses of the desirable pulsed power, as ...

Keywords: pulsed power, inductive energy storage, semiconductor opening switch diodes, ozone generation, ozone yield, oxide concentration Dependence of initial oxygen concentration on ozone yield using streamer discharge reactor driven by an inductive energy storage system pulsed power generator is described in this paper.

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