

Pulse energy storage generator

What is a pulsed power generator?

Pulsed power generators using magnetic pulse compression circuits have become popular both for research in the bioelectric field and for industrial applications of pulsed power. Pulsed power generators using inductive energy storage and opening semiconductor switches are able to generate pulsed power with a nanosecond or subnanosecond pulse width.

What is a modular solid state pulse generator?

Finally, a 10-stage modular solid-state pulse generator based on the multi-turn LTD is developed, which adopts modular design. The main output pulse parameters are a pulse voltage ranging approximately from 0 to -5000 V, a pulse current up to -500 A, a pulse width ranging from 200 ns to 5 ms, a rise time of 30 ns and a fall time of 16 ns.

What is the voltage gain of a pulse generator?

charging voltage of the pulse generator is only 28 V. And the voltage gain can reach 357. Compared with ref. ,due to the lack of further theoretical analysis and optimised design of the boost part in ref. ,the output waveform distortion of the single module is serious,and the flat top has disappeared.

How many Hz can a pulse generator produce?

The pulse generator can produce a pulse with a voltage amplitude of -5000 V,a current amplitude of -500 A,a pulse width ranging from 200 ns to 5 ms,and a repetition frequency of 10 Hz. The pulse generator has adopted a modular design to make its structure more compact.

What are solid-state pulse generators based on?

Currently,solid-state pulse generators based on semiconductor devices have been developed. Semiconductor devices have greatly expanded the circuit structure of pulse power technology,which has made pulse generators more compact,modular,repeatable,and longer-lasting.

What is a 160-stage pulse generator?

In 2021,Wang et al. proposed a 160-stage pulse generator,outputting pulses with a voltage of 2.35 kV and a rise time of 180 ps,while the repetition rate reaches 200 kHz. 24 The MBCs are mainly used to generate relatively high-voltage (>5 kV) nanosecond pulses.

In this paper, the principle of inductive energy storage(IES) is applied to twisted pair wire(TPW), served as energy storage unit for generating nanosecond pulse. As a kind of transmission line, the electromagnetic field constraint of TPW is realized by twisting, so it has greater bent flexibility than coaxial transmission line, which makes it ...

current generator using an inductor as energy-storage component based on solid-state Marx adder, in which

Pulse energy storage generator

the structure of the basic unit in solid-state Marx adders is changed. After two times of energy conversion, this current generator produces pulses with a good flat, a fast-rising edge and a fast-

Inductive storage pulse-train generator Abstract: Utilization of inductive storage in production of intense charged particle beams, laser beams, and hot dense plasmas of interest in thermonuclear fusion studies and in other research areas is very attractive because of its inherent compactness associated with energy storage in the form of ...

PVX-4150 high voltage pulse generator offers equally fast pulse rise and fall times, low power dissipation, & virtually no over-shoot, undershoot or ringing ... or ringing. Incorporated into the PVX-4150 is all control and protection logic, support power, energy storage, and output network circuitry. Overview . Overview . Key Features. Features ...

In the article, a new type boost high-voltage nanosecond pulse generator is proposed. The distributed inductance of the transmission line is utilised as the energy storage unit and cooperated with the variable impedance transmission line transformer to generate nanosecond pulses with extremely high-voltage gain.

Nanosecond pulse electric field (ns-PFE) can target the organelles in cells, which can induce tumor cell apoptosis. This interesting electrophysiological effect implies that it is possible to inhibit tumor recurrence and metastasis. Due to the anisotropy of biological tissue, higher requirements are put forward for the output impedance regulation ability and waveform of pulse generator, ...

This paper designs a modular solid-state pulse generator based on the principle of the multi-turn LTD. The pulse generator can produce a pulse with a voltage amplitude of -5000 V, a current amplitude of -500 A, a pulse ...

A high voltage pulse generator based on inductive intermediate energy storage has been constructed. The current switching technique used in the generator is based on a resonance system.

Each module consists of 18 energy storage capacitors, metal-oxide-semiconductor field-effect transistors and their driving circuits connected in parallel. The pulse generator can output pulses with parameters including a voltage ranging from 0 to 5000 V, a pulse current up to -500 A, and a pulse width ranging from 200 ns to 5 ms.

Although generators have different operating principles, they generally are configured in a structure that includes a charger, an energy storage, a switch, and a load (Fig. 15.1). A pulse generator works in the way of "slow charging and fast discharging".

The advantages are compactness and the low cost of the primary energy store. 9, 10 The objective of this study was to develop and investigate a compact pulse generator with intermediate inductive ...

Pulse energy storage generator

The common energy storage methods in the current pulse power systems are capacitive energy storage (CES) and inductive energy storage (IES), each with its own advantages and disadvantages.

Figure 2.27 shows a typical pulsed power generator using inductive energy storage and an opening switch. The capacitor, C_0 , which is charged to V_0 , is discharged through a pulse transformer, PT, and SiC-MOSFET as ... This pulse generator is able to generate very fast pulses with a risetime of several hundred picoseconds and a voltage ...

--A high-voltage pulse generator with an inductive energy storage is described. Its operation is based on the current interruption by a thyatron. It was shown that a T ... < 2-500/20 thyatron is capable of reliably interrupting the current with an amplitude of 800-850 A in an inductive energy storage, forming from a low-

Download scientific diagram | Energy storage in the Marx pulse generator. Mechanism of (a) charge and (b) discharge. from publication: The energy and cost calculation for a Marx pulse generator ...

Using a pre-pulse-sustainer circuit technique based on inductive energy storage and semiconductor opening switch generators allows the formation of a pre-pulse with high amplitude and short rise ...

The common nanosecond pulse generator is based on capacitive energy storage. Compared with the nanosecond pulse generator based on capacitive energy storage, the inductive energy ...

In this paper, a new type of boost pulse-forming line generator is proposed. Combining the advantage of a short pulse generated by the transmission line and the principle of inductance ...

The proposed generator combines the inductive energy storage of transmission lines with a variable-impedance transmission line transformer to generate a nanosecond pulse ...

The main contribution of this paper is a new high voltage pulse generator with the following characteristics, 1) a capacitor is paralleled with the main switch to reset the transformer core and to provide the soft switching condition for the switch. ... In particular, but not only does it include high-density energy storage technologies, pulse ...

Design and operation of a compact full solid-state pulse generator is presented. The pulse generator can create 20 ns FWHM, 60 kV amplitude pulses into 300-ohm load. ... The energy storage unit ...

As an extension research of pulse power generation method, we proposed a new variant of pulse generation circuit based on hybrid energy storage (HES). The energy storage structure of the proposed circuit is a series connection of two capacitors and one inductor, referred as a CLC series HES circuit. Under the control of two switches, the capacitors on both sides ...

Pulsed current generators using inductive energy storage (IES) can satisfy this demand, and there have been

Pulse energy storage generator

many studies on inductive pulsed current generators [12,13,14,15]. When the current flowing through the inductor changes, counter electromotive force will be generated at both ends of the inductor to maintain the original current amplitude.

A 500 kV fast pulse generator has been constructed using coaxial cable in a stacked-Blumlein arrangement. The generator design is relatively simple, being easy to construct and inexpensive. ... The pulsed power generator with an inductive energy storage system is investigated as a driver for a high power microwave source.

This paper proposes a new self-triggering topology for pulse generators based on avalanche transistors MBCs and LTD, which significantly simplifies the entire generator's requirement for trigger system synchronization ...

HV pulse generators have been preferred to classical ones such as Blumlein lines, pulse forming networks, and Marx generator [8- 10]. In [8], an HV pulse generator based on positive and negative buck-boost converter is proposed. This structure is fed from a relatively low voltage DC source, which can generate both unipolar and bipolar pulses.

The experimental results show that the proposed new type pulse generator can realize square wave short pulse output with rising time of 6 ns, adjustable pulse width of 9-20ns, repetition ...

as the energy storage element and charged by the primary energy storage element capacitor. With switches turning off, inductances discharge in series to produce pulse on load. The four-stage generator can generate pulse with a voltage of 9.2 kV and pulse width of 170 ns, when the charging voltage is 200 V.

Pulse Power. Flywheel Energy Storage Systems are used in a wide range of applications, including grid-connected energy management and uninterruptible power supply. With the advancement of technology, the FESS application is undergoing rapid renovation. ... A homopolar generator is another term for a homopolar generator. Grid Energy Storage.

Plasma technology is gaining increasing interest for gas conversion applications, such as CO₂ conversion into value-added chemicals or renewable fuels, and N₂ fixation from the air, to be used for the production of small building blocks for, e.g., mineral fertilizers. Plasma is generated by electric power and can easily be switched on/off, making it, in principle, suitable ...

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. ...

orders of magnitude in comparison with the high-voltage pulse widths (Pai and Zhang 1995b). Energy storage

Pulse energy storage generator

can be done in many different ways, where electrical energy stored in capacitors and magnetic energy stored in inductors have been widely employed. If one compares the energy storage density capabilities of electric and

C/D) because of the risk of receiver damage due to high peak voltages. The base-band pulse generators usually comprise of an energy-storage device (electrostatic, magnetic field) and a switch which discharges a fraction or all of the energy into a load. The pulse-modulated RF generator uses a harmonic signal with a pulse envelope.

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