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Utilization of Nanotechnology Optical Fibre for Electricity Transmission

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Abstract

The operation of the power network depends on the power communication network. This research investigates the use of optical fibre nanotechnology in power communication transmission. The optical transmission network technology, which is the primary transmission technology, is applied to the power communication network and a functional model of the optical transmission network device node is constructed. In the optical transmission network, the form of the terminal multiplexing device function module, the electrical cross device function module and the photoelectric hybrid cross device function module are examined. Utilizing optical transmission network technology, the optical multiplex portion and the optical transmission section are both subjected to the optical fibre nanotechnology. Strong third order optical nonlinearity of optical fibre nanotechnology and optical soliton communication are used in the power communication network to convey data. The experimental results demonstrate that the rate of the digital communication interface is higher than 7,000 bit/s in various service quantities and the loss of the communication cable is within the standard range when optical fibre nanotechnology is applied to power co communication transmission. This successfully verifies the dependability of optical fibre nanotechnology for the transmission of power.

Keywords: Osmotic stress; PEG-6000; Maize leaf segments; Antioxidative enzymes; Power communication transmission

Introduction

Power communication and the power system, safety and stability control system and dispatch automation system are the three primary forces of power system security and stable operation. Power communication is primarily to ensure the safe and stable operation of the power system. Electric power communication is the foundation for the diversification of operations in non-electrical industries and is used for power grid automation control, modern management and commercial operation services. Power system communication techniques are diversifying as a result of the ongoing advancement of communication technologies. The optical fibre communication technology provides the benefits of anti-electromagnetic interference, high voltage and huge current due to the long relay distance, large transmission capacity, and superior transmission quality. Its application in power communication is likewise expanding steadily. As civilization advances and develops, a growing number of jobs necessitate electricity in all spheres of life. The power communication system is required for the signal transmission of office automation to be successful. The power structure is highly professional and obviously relevant. The communication network needs to be scalable so that it can accommodate the requirements of various work stages. To maintain its regular functioning, the power system must rely on the power communication system, thus it is imperative to guarantee the power communication system's dependable performance. In today's world, electric energy permeates every part of people's daily lives. Power outages will cause significant economic losses once they happen.

Description

Power system operation and power communication systems are inseparable due to the effective advancement of automated power systems. Power system signals must be extremely reliable to be used since they play an indispensable function in power communication systems. With the introduction of optical fibre communication, its dependability has become more apparent. Power supply firms must keep improving their own needs in light of the rapidly expanding power sector in order to advance and grow the power grid. The development and expansion of the electricity grid require a strong expansion, which is a prerequisite. Low latency ensures that communication is conducted at a high pace and delay in power communication is rigorously minimized. The person in charge can be alerted as soon as a danger or disaster occurs to help reduce damage. Rapidity defines

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the optical fibre communication rate. Silicon dioxide is the primary component needed for optical fibre transmission. China has large deposits of silica compared to other energy sources. The growing usage of optical fibre communication contributes to the decline in power communication losses from various power sources. Additionally, it protects the environment and lowers air pollution, which has a significant impact on China's economy's ability to grow sustainably. Higher demands are made of optical fibre communication's transmission capacity (transmission rate) due to the quick development of modern information. Due to loss, dispersion and the slow electronic response times of the optical electronic relay devices along the route, linear optical fibre communication systems currently have poor transmission rates and limited relay distances. The cost of the relay device rises steadily as the transmission rate approaches 10 Gb/s or higher, which is a significant barrier to the optical fiberization of the communication system. Optical soliton communication is one such all optical line solution that successfully addresses the aforementioned issues. The refractive index nonlinear Self Phase Modulation (SPM) effect also known as the optical Kerr effect is brought on by the intensity in the optical fibre when the refractive index of the optical fibre material SiO_2 is nonlinearly related to the field strength of the optical pulse. The Group Velocity Dispersion (GVD) effect can be cancelled out by the optical pulse compression generated by the anomalous dispersion area, keeping the optical pulse's shape constant throughout transmission. The fundamental issue with optical soliton communication and the foundation for establishing ultra high speed, ultra long distance, all optical communication is optical soliton transmission in soliton communication systems. The transmission of optical solitons is influenced by a variety of circumstances. The optical fibre has a very high transmission capacity and a bandwidth of 25 THz. Because loss and dispersion are two major variables that limit the transmission of optical data, optical fibre communication systems currently have transmission rates that are substantially lower than 25 THz. The optical bistable devices (optical switches, etc.) needed for high speed optical communication technologies must have quick response times on the order of picoseconds. The so called "bottleneck effect" problem is brought on by the fact that semiconductor optical switches have response times on the order of nanoseconds, which is considerably too slow for high speed optical communication. All optical logic devices will need to be quick to react in the all optical communication sector of the future, but they also need to perform very well in the following two areas. To make the integration of the optical device easier, the material utilized in the device must first have a high nonlinear coefficient. Second, the material has a low loss and low threshold power to cut costs. The materials now in use fall short of fulfilling this criterion. In order to create a nano optical fibre, it is suggested that semiconductor nanoparticles smaller than the exciton Bohr radius be incorporated into an incompatible optical fibre material (SiO_2 medium). The third order optical nonlinear response is significantly improved in this material system because the semiconductor particles display quasi zero dimensional quantum dot characteristics due to the three dimensional strong confinement of the dielectric barrier. Additionally, this improved nonlinear response has low saturation absorption intensity, a tiny threshold power, a quick reaction on the order of picoseconds, and low loss characteristics. With the introduction of quantum dot semiconductor materials, electrons are constrained to point formations and zero dimensional quantum confinement is accomplished. Both new optical communication systems and optical communication equipment will be available.

Conclusion

The reliability of power communication transmission is improved by the strong third order optical nonlinearity technology and optical soliton communication technology based on optical fibre nanotechnology. These technologies are applied to optical transmission networks and optical fiber nanotechnology. Optical fibre nanotechnology can be used to transmit power communications, choosing the best route quickly and improving communication efficiency. This demonstrates that the small capacity, resource shortage and poor stability of the current communication equipment can be effectively solved by the power communication network using optical fibre nanotechnology, which can meet the needs of various production and business information in the transmission process of power communication in the future.