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Letter to Editor

The Use of Optical Fibre Nanotechnology in Power Transmission

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LETTER TO EDITOR

The major purpose of power communication is to ensure the safe and stable operation of the power system. The three basic forces of power system security and stability are power communication and power system, safety and stability control system, and dispatch automation system. Electric power communication is used to govern power grid automation, provide modern management and commercial operation services, and provides the foundation for non-electrical industrial diversification. The communication mechanisms used by power systems are growing more and more diverse as communication technology advances. The optical fibre communication technology provides the advantages 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 also expanding. With the advancement and growth of society, more and more sorts of work in all sectors of life are necessitating the use of electricity. The power communication system is required to complete the signal transmission of office automation. The power structure demonstrates a high level of professionalism and pertinence [1].

The communication network must be scalable to meet the demands of various stages of activity. Because the power system relies on the power communication system for proper operation, it is critical to assure the power communication system's reliability. Electric energy is inextricably linked to people's daily lives in modern civilization. When there are power outages, there will be significant economic losses. Power system operation is inextricably linked to power communication networks as the degree of automation of power systems improves. Signal transmission in power communication systems is critical, and power system signals must be highly reliable in order to be used. With the introduction of optical fibre connection, the reliability of the system has become increasingly apparent. Power supply companies must continue to strengthen their own needs in order to keep up with the rapid development of the power business. The power grid should be developed and expanded [2].

The development and extension of the electrical grid are both dependent on strong expansion. Delay is rigorously limited in power communication, and low latency ensures that communication is conducted at a high rate. In the event of a hazard or disaster, the person in charge can be warned as quickly as possible so that the damage can be minimized. Rapidity is a characteristic of optical fibre communication rates. Silicon dioxide is the most important component of optical fibre communication. China's silica reserves are plentiful when compared to other energy sources. The growing usage of optical fibre communication in power communication helps to reduce losses in other power sources.

At the same time, it protects the environment and reduces air pollution, both of which are critical for China's long-term economic development. With the rapid expansion of modern information, increased demands are placed on optical fibre communication transmission capacity. Due to loss, dispersion, and the electronic reaction speed of optical electronic relay devices along the route, linear optical fibre communication systems currently have a poor transmission rate and short relay distance. When the transmission rate reaches 10 Gb/s or more, the price of the relay device skyrockets, posing a severe impediment to the optical fiberization of communication system transmission. Optical soliton communication is an all-optical line system that can be used to tackle the challenges mentioned above [3].

When the optical fibre material SiO_2's refractive index is nonlinearly related to the field strength of the optical pulse.The intensity in the optical fibre causes the refractive index nonlinear self-phase modulation effect. The light pulse broadening induced by the group velocity dispersion effect can be cancelled out by the optical pulse compression caused by the anomalous dispersion area, keeping the shape of the optical pulse unchanged during transmission. The basic difficulty of optical soliton communication is optical soliton transmission, which is also the foundation for accomplishing ultra-high speed, ultra-long distance, and all-optical communication. Optical soliton transmission is influenced by a variety of factors.

The optical fibre has a bandwidth of 25 THz and a very large transmission capacity. Because there are two key limiting issues for the trans- mission of optical signals: loss and dispersion, the

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transmission rate of optical fibre communication systems is now much lower than that of 25 THz. Optical bistable devices must have response times on the order of picoseconds in order to enable high-speed optical communication technology. The response time of semiconductor optical switches is on the order of nanoseconds, which is considerably too slow to fulfil the demands of high-speed optical communication, resulting in the so-called "bottleneck effect." To enable the integration of the optical device, the material employed in the device must have a significant nonlinear coefficient [4]. Second, to cut costs, the material has a low threshold power and low loss. This demand is not properly met by existing materials. On this premise, it is proposed that semiconductor nanoparticles smaller than the exciton Bohr radius be inserted in an incompatible optical fibre material to construct a nano optical fibre. The semiconductor particles in this material system are exposed to the dielectric barrier's three-dimensional strong confinement, displaying quasi-zero-dimensional quantum dot properties, and the third-order optical nonlinear response is considerably increased. Furthermore, this increased nonlinear response exhibits minimal saturation absorption [5].

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Conflict of Interest

None

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