

The Research of Application on Power Electronics Technology in Electrical Control

Yiming Zhang

School of Electrical and Electronic Engineering, North China Electric Power University, Beijing 102206, China

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Abstract: With the rapid development of power electronics technology, it brings great convenience to people's production and life, and has been widely used in electrical control. Based on this, this paper briefly introduces the application advantages of power electronics technology in electrical control, and discusses its specific applications, respectively in switching program, reactive power compensation device, overcurrent protection, power filter and PWM technology.

1. Introduction

Power electronic technology includes electronic and electrical principles and automatic control technology. It has the characteristics of full control and integration. Through scientific and reasonable cooperation among the three, the functions of electronic technology are fully brought into play and are widely used in electrical engineering. It improves the control level and capability of electrical equipment and plays a key role in maintaining the stability of the power system.

2. Application Advantages of Electronic Technology in Electrical Control

With the increasing demand for power resources, the demand for power systems is also increasing. Moreover, due to the complex characteristics of power systems, there are many contents and knowledge principles involved, and their comprehensiveness is extremely strong. In the process of management, workers are prone to operational errors and system failures are more frequent. However, the continuous development and reasonable application of power electronics technology have made the operation of the power system simpler and more controllable, greatly reducing the problem of system failures caused by human factors, simplifying the operation, reducing the difficulty of work, reducing the pressure on staff, not only effectively improving the work efficiency, but also improving the stability of the entire electrical system. Reasonable use of power electronics technology can reduce the probability of power system failures and greatly reduce potential safety hazards. With the development and progress of power electronics technology, the power system is also continuously developing, thus making electrical engineering more perfect. Due to China's large population, in the process of production and living, there is a great demand for power resources. With the acceleration of urbanization and the continuous development of economy and science and technology, China's demand for power resources is increasing day by day. The demand for power supply quality of power system is becoming more and more strict. Power electronics technology has shown certain advantages in performance, operation and other aspects, making it widely used in electrical engineering, continuously promoting the good development of electrical engineering, and further promoting the progress and development of social productivity [1].

3. Application of Power Electronics Technology in Electrical Control

3.1 Application in Switching Procedures

In the process of electrical engineering development, people's requirements for the stability and quality of the power system are also getting higher and higher, prompting the development of power equipment and devices towards a simpler and lighter direction. In the traditional power system, the

space occupied by transformers, filter inductors and other devices is generally improved by controlling the frequency of switches. Although high-frequency circuits can make the devices lighter, at the same time high-frequency switches will certainly increase losses, produce certain interference to electromagnetism, and ultimately affect the transmission efficiency of the circuits. The application of power electronics technology in switching programs is reflected in the following aspects. Firstly, the application of power electronics technology has increased the number of topologies. For example, at present, many families use electronic switches to control, which can effectively avoid the occurrence of line damage caused by excessive external current. Through the application of electromagnetic wave sensing technology, the topology quantity is effectively controlled, and then the current of the line is controlled. Secondly, the application in resonant circuit switch is also important. Because resonant circuits have higher requirements for efficiency, electronic technology is often applied in resonant circuits to control the frequency of switches. Experience shows that when the frequency of switches is greater than 1MHz, its performance is higher. Thirdly, simple circuits can also be connected and integrated in series and parallel.

3.2 Application of PWM Technology

PWM technology is a technical means to obtain equivalent waveform by setting the pulse width. It is a very common power electronic technology in electrical control, and its development space is very broad. PWM control technology takes the principle of area equivalence as its technical basis. Generally speaking, it controls and adjusts narrow waves with equal areas but inconsistent shapes, thus completing the processing of signals. At present, PWM technology has been widely used in various converter circuits, among which the direct-direct chopper circuit is the one with the best application effect. The PWM control technology in this circuit is also relatively mature at present. PWM technology is mainly realized by matrix frequency conversion circuit in alternating circuit. Although this technology has not been widely popularized and applied at present, this circuit has a very considerable application prospect.

3.3 Application of Reactive Power Compensation Device

With the increasing demand for electricity, it is required that the power variation of the power grid can meet the demand to a certain extent. However, if the frequency of the power grid changes frequently or its load is affected and impacted to a certain extent during the operation of the power grid, it will pose a certain threat to the safety and stability of the normal operation of the power grid. However, the application of electronic technology in reactive power compensation device can make the electrical equipment that cannot do work normally still keep normal in a short period of time. For example, if a bus line of an electrical device fails in a power system, the application of electrical and electronic technology can make the line still maintain normal power transmission at the initial stage of the failure, thus buying time for the maintenance of the failed line. The application of reactive power compensation device can not only improve the stability of power system operation and the level of power supply quality, but also realize good control of circuit and voltage and reduce power grid losses.

3.4 Application of Overcurrent Protection

During the operation of the power system, once a certain link fails, it is easy to cause overcurrent problems. In the traditional power system, the purpose of interrupting current is achieved through devices such as terminal fuses to avoid damage to important circuits. However, with the gradual improvement of power electronic technology, electronic devices have gradually become simpler and more convenient, and the power of power electronic devices has also increased. Therefore, in order to protect the safety and stability of the power system, special over-current protection devices are needed to realize the regulation and control of the circuit. Currently, power and signal over-current protection devices are mainly used. In the process of power transmission, current protection will be started when abnormal signals occur. For example, the most typical protection method is the bridge arm interlock protection method. When the current signal is abnormal, this method can cut off the drive signal in time to avoid short-circuit fault, so as to ensure the stability of power system

operation.

3.5 Application of Power Filter

The application of power electronics technology in electrical control is also reflected in the use of power filters. The use of the power filter can effectively improve the efficiency of the electrical control system. With the blessing of electronic technology, the power filter obtains harmonic current through effective analysis of compensation devices in the circuit system, and then uses the current components opposite to the harmonic current to cancel the harmonic current and convert the harmonic current into fundamental current, thus realizing the protection of system functions. Moreover, the power filter can improve the response speed and anti-interference ability of the system, reduce the influence of the outside on the system to a certain extent, improve the stability of the system and ensure the normal operation of the system [2].

4. Conclusion

In recent years, with the continuous progress and development of electronic technology, it has been widely used in all walks of life. New science and technology have gradually been trusted and relied on by people. Applying power electronics technology to electrical control can not only simplify the operation process and improve the work efficiency, but also effectively improve the power supply stability of the power system. I believe in the continuous development of electronic technology, it will also promote the development of electrical engineering.

References

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