

Control Algorithm Design of Single-Phase Inverter For ZnO Breakdown Characteristics Tests

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Abstract : ZnO voltage dependent resistor was widely used as components of the electrical system for over-voltage protection. It has a wide application prospect in superconducting energy-removal, generator de-excitation, overvoltage protection of electrical & electronics equipment. At present, the research for the application of ZnO voltage dependent resistor stop, it uses just in the field of its nonlinear voltage current characteristic and overvoltage protection areas. There is no further study over the over-voltage breakdown characteristics, such as the combustion phenomena and the measure of the voltage/current when it breakdown, and the affect to its surrounding equipment. It is also a blind spot in its application. So, when we do the feature test of ZnO voltage dependent resistor, we need to design a reasonable test power supply, making the terminal voltage keep for sine wave, simulating the real use of PF voltage in power supply conditions. We put forward the solutions of using inverter to generate a controllable power. The paper mainly focuses on the breakdown characteristic test power supply of nonlinear ZnO voltage dependent resistor. According to the current mature switching power supply technology, we proposed power control system using the inverter as the core. The power mainly realize the sin-voltage output on the condition of three-phase PF-AC input, and 3 control modes (RMS, Peak, Average) of the current output. We choose TMS320F2812M as the control part of the hardware platform. It is used to convert the power from three-phase to a controlled single-phase sin-voltage through a rectifier, filter, and inverter. Design controller produce SPWM, to get the controlled voltage source via appropriate multi-loop control strategy, while execute data acquisition and display, system protection, start logic control, etc. The TMS320F2812M is able to complete the multi-loop control quickly and can be a good completion of the inverter output control.

Keywords : ZnO, multi-loop control, SPWM, non-linear load

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