

Contribution ID: 325

Type: Poster

## Design of High Precision Power Supply Control System for ITER Platform

Wednesday 7 June 2017 13:40 (2 hours)

As one of the core equipment of ITER DC steady-state test platform, high precision power supply is a large capacity AC/DC/AC single-phase inverter with current source characteristics, which provides ± 2000V / 500A output. The difficulties of high precision power supply are high voltage and large current. To meet requirement of high precision output and fast response, the scheme of cascaded H-bridge inverts with IGBT is presented. The switching frequency of high power switching device is low, however low-frequency PWM control will lead to a large number of low frequency harmonics in the output waveform. The technique of carrier phase-shifted PWM based on DSP is applied to decrease the switching loss of IGBT, raise the equal switchfrequency of inverter and improve the performance of output current wave.In the case where the cascaded H-bridges inverter uses unipolar PWM modulation mode, it is verified by MATLAB simulation and mathematical formula that the maximum harmonic is mainly concentrated in the vicinity of 4F±1 (F is the carrier ratio), the output voltage is 9 levels and the amplitude is 4 times of a single H bridge output voltage. In this paper, the combination of DSP and CPLD are used to obtain sixteen PWM drive signals. First, Using TMS320F2812 on-chip event manager EVA and EVB to get phase complementary drive signal PWM1/PWM2、PWM7/PWM8. Second, sending the above four drive signals to CPLD, four PWM drive signals with an initial phase angle lag 45° are generated through delaying and phase-shifting. Third, Using sixteen PWM drive signals to control the opening and closing of the IGBT on the four H-bridge arms. Compared with the traditional current closedloop control strategy, incremental PID control algorithm with anti-integral saturation is adopted in this paper to shorten the time of system stability and improve the accuracy of current. The experimental results show that the control system based on TMS320F2812 can realize the high precision output of power supply.

## Eligible for student paper award?

No

Author: Mr JU, Peng (Institute of Plasma Physics, Chinese Academy of Science)
Presenter: Mr JU, Peng (Institute of Plasma Physics, Chinese Academy of Science)
Session Classification: W.POS: Poster Session W

Track Classification: Power supply systems