Contribution ID: **2595** Contribution code: **WEPM083** Type: **Poster Presentation**

Reliability analysis of digital controller for magnet power supply based on optocoupler failure

Wednesday 10 May 2023 16:30 (2 hours)

In CSNS, there are more than 350 devices in the accelerator power supply system, which respectively provide precise excitation current for the magnet load. Therefore, the stable operation of the power supply is an important prerequisite to ensure the beam quality, and also one of the necessary conditions for the normal operation of the CSNS.
In accelerator power system, digital controller is widely used because of its flexibility and reliability. However, with the accumulation of running time, the failure of power supply caused by the fault of the digital controller often occurs, which affects the operation efficiency of the accelerator. Through the analysis and detection of the failed digital controller, it is found that the failure is basically caused by the optocoupler failure.
In this paper, firstly, by dividing the digital controller into functional modules, it is equivalent to series system. According to the reliability principle of series system, the failure of any part will lead to the failure of the whole system. Secondly, according to the nature of the optical coupling failure is revealed, the reliability model of the controller considering the optical coupling failure is established, and the overall life evaluation of the controller is obtained. Finally, for the failure caused by optocoupler failure, a redundancy strategy is proposed for this part to improve the reliability.

Funding Agency

This work is supported by the Key Laboratory of Particle Acceleration Physics & Technology, Institute of High Energy Physics, Chinese Academy of Sciences, No JSQ2020ZZ06.

Footnotes

I have read and accept the Privacy Policy Statement

Yes

Author: ZHAO, Guodong (Institute of High Energy Physics)

Co-authors: HUANG, Yuan (Dongguan Neutron Science Center); LI, JUN (Dongguan Neutron Science Center); LIU, Yuntao (Institute of High Energy Physics); QI, Xin (Chinese Academy of Sciences); ZHANG, Wenqing (Chinese Academy of Sciences)

Presenter: ZHAO, Guodong (Institute of High Energy Physics)

Session Classification: Wednesday Poster Session

Track Classification: MC7: Accelerator Technology and Sustainability: MC7.T11: Power Supplies