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Reliability Analysis of Pulsed High Magnetic Field Facility at WHMFC

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In order to accurately evaluate the reliability of Pulsed High Magnetic Field Facility (PHMFF) at Wuhan national pulsed High Magnetic Field Centre (WHMFC), a reliability analysis method based on Markov chain and reliability block diagram is introduced in the paper. PHMFF is composed of lots of pulsed power modules, magnet coils and its corresponding control system. Based on the hardware of PHMFF, different magnetic systems are dynamically constructed for generating diversified waveforms. Therefore, the reliability of PHMFF is in fact determined by the actual operating magnetic system. In terms of the reliability of a specific magnetic system, firstly Failure Mode and Effect Analysis (FMEA) method is used to find out main failure modes of each subsystem in PHMFF, and then Markov chain model is established to analyze and calculate the reliability of subsystems. Finally, according to the reliability block diagram, the reliability of different magnetic systems can be concluded. The calculation results show that the reliability of all subsystems is above 95%. Although for some complex magnetic field system, the reliability index has declined, it still meets the experiments requirements.

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