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## Research of Active Regulation for High-Stability Flat-Top Pulsed High Magnetic Field

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Pulse generator is one of the common power supply for flat-top pulsed magnetic field for its advantages of large energy storage and flexible control. However, some characteristics of pulse generator, such as nonlinearity and time-varying, limit the effect of measures by optimizing control strategy to improve the stability of flattop. On the base of pulse generator power supply system for flat-top pulsed magnetic field at Wuhan National High Magnetic Field Center (WHMFC), a scheme of parallel active regulator composed by cascade H-bridge converter is proposed in this paper. PI feedback control with Carrier Phase Shifted Sinusoidal Pulse Width Modulation (CPS-SPWM) is adopted by the regulator to adjust the ripple during the flat-top. A 50 T/140 ms flat-top pulsed magnetic field with the ripple less than 100 ppm is achieved through system modeling and simulation. An optimal control strategy combining selective PI control and repetition control is proposed to restrain the circulating current between pulse generator and active regulator. Selective PI control is designed for the regulator that the ripple at flat-top is divided into two parts by 20 Hz low pass filter. One part with the frequency under 20 Hz is regulated by ripple tracking control and the other is regulated by PI control. Repetition control is used for the pulse generator to optimize the triggering angle of the rectifier. In order to verify the effectiveness of the optimal control strategy for high-stability flat-top pulsed high magnetic field with the active regulator, experimental data about the triggering angle of rectifier is employed into the simulation model, and the result shows that circulating current between pulse generator and active regulator has been suppressed effectively.

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