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Design of an Active Power Compensator for 60T Flat-top High Magnetic Field System

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Flat-top high magnetic field (FTMF) is a significant research method for physics, chemistry, biology and other scientific fields with the demands for higher magnetic intensity, longer flat-top pulsed width and a lower ripple. To meet these demands, a new FTMF system based on multiple-capacitors power supply has been realized at the Wuhan National High Magnetic Field Center in March 2021. However, the ripple of the magnetic field was 3000 ppm. In order to reduce the ripple of the FTMF, an active power compensator consists of lead-acid battery power supply, active power filter and compensatory magnetic coil is designed in this paper. A self-adaptive PI controller with the fuzzy control method is adopted to improve the controlling accuracy. The MATLAB/Simulink platform is used to establish the model of FTMF system and the preconceived 60T/70ms flat-top pulse with ripple less than 200 ppm is generated.

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