Contribution ID: **664** Type: **Poster Presentation of 1h45m**

A new three-level repetitive pulse magnetic field power supply system

Monday, 28 August 2017 13:15 (1h 45m)

Repetitive Flat-top Pulsed High Magnetic Field (RFPHMF) could widely be applied to biology, materialogy, iatrology, condensed matter physics, and many industrial applications. Nowadays, the development direction of the RFPHMF focuses on accelerating the magnetic field establishment, elevating the pulse amplitude, extending the pulse duration, enhancing the flat-top precision, boosting the charging frequency. The magnet being energized, the coil resistance skyrocket to 7˜10 times bigger due to the temperature rising, hence consuming more energy, jeopardizing the flat-top current precision and the cooling-process/charging-frequency. A three-level charging system has been brought out to acquire the high flat-top precision, high charging frequency magnetic field mentioned above. The structure of the 1st level, a bridge circuit of SCR Diode and IGBT, is used to obtain short rise time by using capacitor to charge the magnet with the cascaded protecting inductor, and to return the current/energy back to the capacitor after the flat-top stage, resulting capacitor's quick recharging and less heat-production/power-dissipation, thus less cooling process and higher charging frequency. The 2nd level structure, a capacitor with low initial voltage-setting and high capacitance, works as a current stabilizer in freewheeling stage to roughly compensate the decreasing flat-top current. Use the 2nd level capacitor to balance out the whole circuit energy-consumption, so that 1st level capacitor can be recharged to initial setting voltage. The 3rd level structure contains an H-bridge and a transformer parallel connecting to the protecting inductor through another big inductor, is designed to regulate the load current by controlling the applied voltage. A prototype of charging device and its matching magnet that can generate 10T magnetic field with precision of 0.1‰ and charging frequency of 10Hzhas been designed and assembled. The simulation and the entity experiments validated the demanding index.

Submitters Country

China

Primary authors: Dr XU, Yun (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology); Mr HE, Kaiwen (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology); Ms HUANG, Siqi (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology); Mr LI, Jinhao (Huazhong University of Science and Technology); Prof. DING, Hongfa (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology); Prof. LI, Liang (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology)

Presenter: Dr XU, Yun (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology)

Session Classification: Mon-Af-Po1.12

Track Classification: H2 - Power Supplies and Flux Pumps