

技术及应用

# HIRFL-CSR二极磁铁电源的研制

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**摘要** 研制了兰州重离子加速器冷却储存环(HIRFL-CSR)二极磁铁电源,提出了一种基于晶闸管相控整流技术和IGBT脉宽调制(PWM)变换技术的同步加速器二极磁铁电源的设计方案,分析、仿真了其工作原理,并设计、生产了1套完整的电源样机。经现场试验、长期运行及测试,电流稳定度 $< \pm 5 \times 10^{-5}/8\text{ h}$ ,跟踪精度 $< \pm 2 \times 10^{-4}$ ,电流纹波 $< 1 \times 10^{-5}$ 。该方案满足HIRFL-CSR二极磁铁对电源技术指标的要求。

**关键词** [同步加速器](#) [电源](#) [脉宽调制](#) [前馈控制](#) [晶闸管相控整流器](#)

分类号

## Development of Power Supply for HIRFL-CSR Dipole Magnet

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**Abstract** The HIRFL-CSR dipole magnet power supply was studied. A novel scheme for designing of the synchrotron dipole magnet power supply based on the phase-controlled thyristor rectifying technology and the IGBT pulse-width modulation (PWM) converting technology was presented. After analyzing and simulating the working principle of this scheme, one complete set of prototype power supply was designed and manufactured. Through long-time on-the-spot running and testing to the prototype power supply, the current stability is  $< \pm 5 \times 10^{-5}/8\text{ h}$ , the tracking accuracy is  $< \pm 2 \times 10^{-4}$  and the current ripple  $< 1 \times 10^{-5}$ . The experimental results show that this scheme can satisfy the technical requirements and indexes of the HIRFL-CSR dipole magnet to the power supply.

**Key words** [synchrotron](#) [power supply](#) [pulse-width modulation](#) [feedforward control](#) [thyristor](#) [phase-controlled](#) [rectifier](#)

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