原子能科学技术 2006 40 (5): 620-624 ISSN: 1000-6931 CN: 11-2044/TL

技术及应用

兰州重离子加速器冷却储存环主环加速过程的束流反馈

张文志[1,2]，景春国[1]，杨晓东[2]，夏佳文[2]，魏宝文[2]

1. 东北大学 秦皇岛分校， 河北 秦皇岛 066004
2. 中国科学院 近代物理研究所，甘肃 兰州 730000

收稿日期 2004-12-24 修回日期 2005-6-20 网络版发布日期: 2006-10-20

摘要 正在建设中的兰州重离子加速器冷却储存环（HIRFL-CSR）主环用于束流的加速。在加速过程中, 为了保证束流的谐振加速, 须准备2个束流反馈环(相位反馈环和束流径向位置反馈环)来保证主导磁场与高频频率的同步。本文基于Laplace变换及数值计算结果，分析了束流反馈环对同步加速器中束流动力学行为的影响。

关键词

同步加速 高频控制 束流反馈

分类号 TL501

Beam Feedback Loops of RF Acceleration System of Heavy Ion Research Facility at Lanzhou Cooler Storage Ring/Main Ring

ZHANG Wen-zhi[1,2], JING Chun-guo[1], YANG Xiao-dong[2], XIA Jia-wen[2], WEI Bao-wen[2]

1. Northeastern University at Qinhuangdao, Qinhuangdao 066004, China;
2. Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou 730000, China

Abstract Heavy ion research facility at Lanzhou cooler storage ring (HIRFL-CSR) is being constructed. It consists of a main ring (CSRm) and an experimental ring (CSRe). The aim of the main ring is to accelerate the heavy ion to high energy. For synchronization between bending magnet field and RF frequency during acceleration process, two beam feedback loops for the frequency control are needed. One is the phase loop and the other is the radial position loop. The effects of these loops on the beam dynamics in the synchrotron are analysed on the basis of Laplace transformation and some numerical calculations.

Key words synchronous acceleration RF control beam feedback

DOI

通讯作者