MT 26
International Conference
on Magnet Technology
Vancouver, Canada | 2019

Contribution ID: **715** Type: **Poster Presentation**

Tue-Mo-Po2.04-08 [22]: Design of focusing solenoids for charged particle beam applications

Tuesday 24 September 2019 08:45 (2 hours)

The design of focusing solenoids used in accelerator magnets or other charged particle beam applications usually has some general design requirements such as focusing strength, stray field, and eddy current losses. In superconducting solenoids specific requirements often include mechanical stress, cryogenic performance, and quench protection. In resistive solenoids specific requirements usually include minimum inductance and impedance.
Solenoids have advantages and disadvantages compared to quadrupole pairs,which also used for focusing charged particle beams. In contrast to a single quadrupole magnet, solenoid magnets can provide simultaneous focusing in both X and Y directions. The focusing strength of solenoids is relatively low compared to quadrupoles due to the second order field effects. The stray field of a single solenoid is relatively high compared to a quadrupole magnet.
This paper proposes several design options to improve the performance of traditional resistive focusing solenoids. These design options include adding bucking coils to limit the stray fields, splitting the main coil to change radial field components to enhance focusing strength, and implementing passive shielding layers to minimize the stray field and coil impedance simultaneously. Simulation results and experimental test data will also be presented.

Author: Dr BAI, Ye (GE Global Research Center)

Co-authors: Dr PRICE, J. Scott (GE Global Research Center); Dr NECULAES, Vasile (GE Global Research Center); Mr SAFDAR, Ali (GE aviation additive)

Presenter: Dr BAI, Ye (GE Global Research Center)

Session Classification: Tue-Mo-Po2.04 - Resistive Magnets for Accelerator and Fusion I