Electro-magnet Quadrupole Design for LEHIPA MEBT

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Abstract

The medium energy beam transport (MEBT) system of the low energy high intensity proton accelerator (LEHIPA) is used to focus and match 3 MeV, 30 mA, proton beam from the radio frequency quadrupole (RFQ) to the drift tube linac (DTL) through a set of 4 electromagnetic quadrupoles and two buncher cavities. The MEBT which is ~ 1 m long is designed with TRACE3-D code for good beam matching and low beam loss.

The design of a compact (effective length ~ 80 mm), high field gradient (~ 40 T/m) electromagnet quadrupole (EMQ) for the MEBT is presented. The design is optimized using 2D and 3D modeling codes, POISSON and CST Studio Suite respectively. The field quality is analyzed by studying the field gradient homogeneity in the transverse plane and integral field homogeneity. Multipole components in the good field region are calculated. In order to suppress the field gradient error and enlarge the good field region, optimization of pole shim design is performed.

Reference

 P. Singh et. Al., "Accelerator development in India for ADS programme", Pramana - Journal of. Physics, 68 (2), 331 (2007)