

DESIGN OF AN ACHROMATIC BENDING SYSTEM

D. Ćirić

Laboratory for Physics, Boris Kidrić Institute
P.O.Box 522, 11001 Beograd, Yugoslavia

The main feature of the achromatic bending systems is that they are virtually insensitive to the momentum variation of the beam. This property makes them suitable for charge and mass analyses of ion beams with high momentum spread.

The achromatic bending system based on the well known Brown's scheme (1), but with the triplet of quadrupoles instead of a single one is analyzed. The system consists of two identical bending magnets and three quadrupoles placed between the magnets. The system is mirror-symmetric with the respect to the plane passing through the center of the second quadrupole.

The first-order optics is used. The achromatic bending with the parallel-to-parallel transformation of the beam in the horizontal and vertical planes is considered. The effect of the fringing field of the deflecting magnets is included.

The system of equations which include the excitation and geometrical parameters of bending magnets and quadrupole lenses is derived. The analytical expressions for the quadrupole excitation parameters and the separations between quadrupoles and magnets were obtained for the thin lens approximation. In the case of thick quadrupole lenses the system of equations is solved numerically. Results for these two cases are compared for 90° achromatic bending system.

(1) S.Penner, Rev.Sci.Instr. 32 (1961) 150.