

FFA@CEBAF Test Simulation Lattice Qualities

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Magnet Structure

The lattice used to conduct tests of the 'acceptance aperture' and to serve as the base for error studies is a version of the segmented magnet lattice design by Stephen Brooks. That is to say each magnet is made up of six slices of types A, B, and C; these magnet slices are arranged as ABCCBA to optimize the field seen by the electron beam passing through them. Inside the Bmad lattice, these slices are connected to each other using a GIRDER element, which allows the six slices to be moved easily in conjunction.

Additionally, the GIRDER elements may be used to support superposed corrector magnets in the future. This is especially convenient as it could provide a simple way to place the corrector in a relative optimum position.

Bmad GIRDER elements

GIRDER elements in Bmad are a type of 'control' (or lord) element. They serve to connect adjacent elements. In Bmad, elements co-supported by a single GIRDER element may have their offsets changed simultaneously. See the usage document about girders in Bmad for details.

Periodic Cell Structure

The order chosen for the periodic cell used in the test lattice is: half length drift, defocusing magnet, full length drift, focusing magnet, half length drift.

This structure allows use of OVERLAY elements to change the drift lengths throughout the cell to accommodate for longitudinal offsets of the magnets without changing the total length of the period (in the lattice).

Bmad OVERLAY element

OVERLAY elements in Bmad are another lord element; overlays can be used to define variations of any attribute with respect to any chosen variable. In this lattice, overlays are used to balance the value of longitudinal offsets in each magnet with the length of the drifts inside each cell such that the total length of each cell remains the same.