G4BL Status

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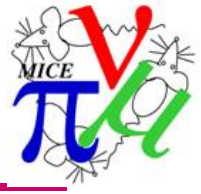
Comments



This is NOT my work, this is work of J.-Francois Ostiguy

Status of G4BL simulations for the g-2 Delivery Beamlines

G4BL Centerline Coordinates

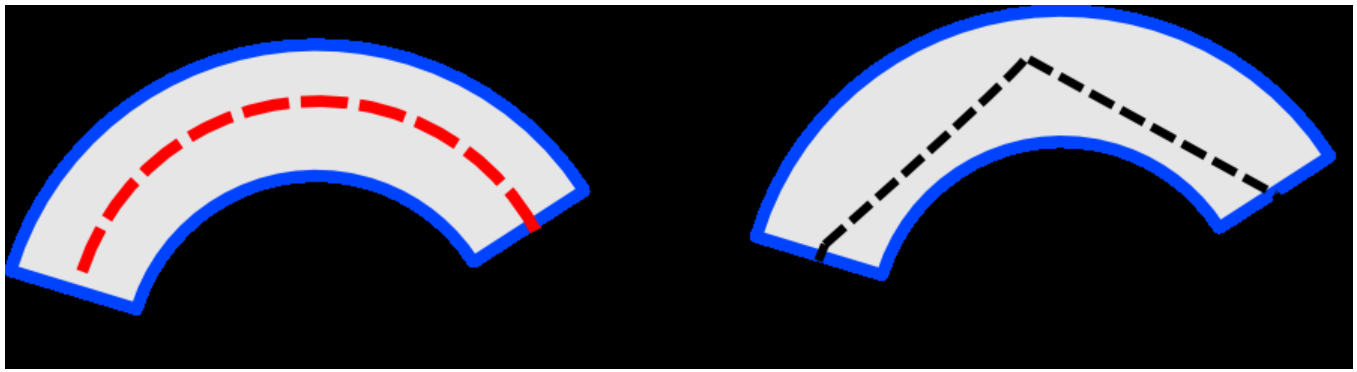
● G4BL does not make any implicit assumption about the "reference" trajectory path to position the elements. In particular, it is the user's responsibility to explicitly construct the reference trajectory by specifying the coordinates transformations that result from the passage through a magnet.

● Within bending elements, G4BL can approximate the reference trajectory using linear segments. This approximation, dubbed "centerline coordinates" uses localized bending, concentrated at a few locations, usually 3 per magnet.

● In G4BL, magnets placement can be performed either in global or in centerline (i.e quasi-reference) coordinates. Typically, magnets are naturally positioned sequentially, along the reference trajectory. When magnets are rotated, rotations are usually specified w/r to the local reference coordinate system at the input face of a magnet. This is how MAD does it.

● Note that knowledge of the global coordinates of the reference trajectory at the input and output faces of each magnet is not sufficient to position the magnets; one also needs to know their orientation in space.

Centerline Coordinates

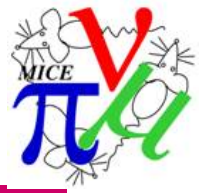


- In MAD, rotation of the coordinates is implicit between the input and exit face.

No coordinate information is available inside of an element.

- In G4BL, reference coordinate rotations in the bending plane need to be explicitly specified.
- The angles need to add up to the net bending of the real magnet. This is achieved with the dedicated commands corner or cornerarc.
- Whenever a magnet is rotated around the s axis, it is imperative that the centerline transformations matches the rotations of the physical magnet. In other words, “corner” and “cornerarc” must be rotated, just like the actual magnets.

Fixes



- The G4BL author (T. Roberts) is very responsive and helpful. That said, funding (and time) for G4BL development/maintenance is limited.
- The G4BL code is clean and well organized. It is also layered on top of G4, so some familiarity with G4 is a pre-requisite.
- Fixes for the RBEND element rotation, the cornerarc transformations and for reading and saving a distribution polarization state have now been implemented.
- They will be incorporated in the next public release of G4BL.

AND THERE WILL BE GREAT CHANGE (IMPROVEMENT).

Motivation