

BEAM TRAJECTORY CALCULATIONS

This is a supplement to CERN/TC/30 - 61/22 which describes program 707-P1.

Program 707-P2

In the original program only lenses of opposite sign could be optimized; and without putting in virtual foci, only the first two lenses after a focal point were varied. In program P-2 any two elements can be optimized: a bending angle versus a horizontally focusing lens, two lenses of the same sign, etc. (*). Part "C" of the data tape is written, for example, as follows:

1	5	1	9	3	5
9	12	9	12	10	11
- 1	1	1	1	1	1

425
→

The first four numbers are, as before, the vertical and horizontal object and image points. The fifth and sixth numbers are the two elements to be optimized. A number must be added at the end. This can be the data tape number.

Program 707-P3

This version does not optimize beam elements. Thus values obtained in program P1 or P2 must be fed in through part "B" of the data tape.

Data tape: [A]

 1 1 - 1

 [B]

 - 1 1

 [C]

 - 1 1

 [D]
 →

Parts "A" and "B" are as before. Part "C" has two columns: the first is the number of the beam point at which it is desired to indicate a separation action, and the second is the separation angle in radians. The program will point out separation in

(*) A bending angle approximating the expected one should be fed in through section "A" of the data tape.

millimeters at each beam point.

Part "D" is a series of 7 numbers.

1. Beam point at which it is desired to put a wedge absorber.
2. The slope of the wedge. Momentum loss (or gain since $\Delta \bar{p} = 0$ on the axis) is proportional to displacement. E.g. .0004 means that a particle arriving at the wedge with 100 mm displacement will have a momentum loss of $\frac{\Delta p}{p} = 100 \times .0004 = .04 = 4 \text{ o/o}$.
3. Initial vertical angle in radians.
4. Initial vertical displacement in meters.
5. Initial horizontal angle in radians.
6. Initial horizontal displacement in meters.
7. Data tape number.

The program will print out the actual trajectories in millimeters and the chromatic aberration for various values of $\Delta p/p$. Dispersion is included directly.

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