

FFAG 2007

ID de Contribution: 26

Type: **Oral presentation**

Coil shaping magnet design

vendredi 13 avril 2007 11:30 (20 minutes)

In the frame of the RACCAM project, the coil shaping magnet design is studied. The main advantages of that method are to allow to keep horizontal tune constant and make possible the variation of k . A first simple model of conductors of infinite length and no iron yoke gives a first set of current intensities using Biot and Savart law. The problem is then to solve the linear system $A \cdot x = B = 0$. The matrix A generated is often ill-conditioned and requires a particular solving method based on matrix 1-norm minimisation. It can give satisfying results in 2d, but current intensities have to be adjusted if the geometry generates an ill-conditioned matrix A . With a 3d simulation (not done yet) other adjustments are needed to match the field law. Pushing geometry investigations a bit further, one can calculate the field generated by a series of conductors of limited length, arc shaped and distributed along a spiral (the one which supports the edges of the magnet). If arcs centers are located at machine ring center, it appears clearly that the maximum field of one conductor is not always located inside the limits of the iron yoke. This still have to be confirmed with a 3d simulation.

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Classification de Session: Technology for FFAG accelerators

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