90 mm and 35 mm Dipoles

Ramesh Gupta
Questions from the last meeting (35 mm aperture dipole)

Super-imposition of magnetic field from dipole and 3-pole wiggler:

- Check integral field of the two
- What about field harmonics?

Two field profiles with the same integral field may have vastly different field harmonics.

Generally larger wiggle (more up and down in the field fall-off), indicates a larger peaks in local harmonics and this may also generate larger integral harmonics.

Initial design of larger aperture (90 mm) dipole:

- A number of 2-d designs.
- The desired goal is that the two dipoles (35 mm and 90 mm) run from the power supply.
Interaction between the Dipole and 3-pole Wiggler Fields

- Compare the integral field of the two when they are close and when they are far off (only dipole)

- But what about the field harmonics?

Two field profiles with the same integral field may have vastly different field harmonics.

Generally more up and down in the field fall-off, indicates larger peaks in local harmonics (however, integral harmonics may be more relevant)
Comparison of Integral Field

Integral field ($B_y$) of ½ dipole by itself in this model is: 531.8 T.mm (error ~0.6 T.mm).

- 90 mm space: 530.8 T.mm
- 50 mm space: 530.7 T.mm
- 30 mm space: 528.0 T.mm
- 10 mm space: 523.2 T.mm
Comparison of the End Fields in Various Designs

Blue: Conventional racetrack with significant space for coil ends
Red: New efficient end design with zero space for coil ends
Black: Latest design – efficient ends + shield (fastest field fall-off).

PROBLEM DATA
- Problem: BCAP 3
- TCSCA Magnetoelastic
- Nonlinear materials
- Simulation No 1 of 1
- 2671597 elements
- 453180 nodes
- 3 conductors
- Nodally interpolated fields
- Activated in global coordinates

Field Point Local Coordinates
Local – Global

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