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Field quality improvement of septum magnets for SuperKEKB injection system

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The SuperKEKB accelerator, a collider consisting of 7 GeV electron and 4 GeV positron rings, is ongoing in order to supply a great number of interaction events of electrons and positrons to the Belle II detector which explores the new physics beyond the standard model.
The important milestone is to obtain integrated luminosity of 15 /ab in the next decade,
so that the luminosity should exceed 2 x 10^35 /cm^2/s in several years.
One of the essential issues is the injection performances for both rings to be capable of storing beams of a few amperes due to overcoming their short lifetimes.
The key component of the injection system is the septum magnets.
It has been found that a transverse fringe field near the septum plate has sizable multipole components.
A tracking simulation shows such fringe fields induce a vertical non-Gaussian tail,
which could cause a beam background as well as a bad injection efficiency.
Adjustment of Q-magnets for cancellation does not work perfectly for non-linear components.
To reduce the multipole region contributes to the injection amplitude to be smaller, and so, that derives improvements of injection performances.
This paper reports about the field quality improvement of the septum magnet for the SuperKEKB HER injection system.

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Footnotes

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Yes

Primary author: MORI, Takashi (High Energy Accelerator Research Organization)

Co-authors: KODAMA, Kota (High Energy Accelerator Research Organization); TAWADA, Masafumi (High Energy Accelerator Research Organization); KIKUCHI, Mitsuo (High Energy Accelerator Research Organization); NAITO, Takashi (High Energy Accelerator Research Organization); UEDA, Takeshi (High Energy Accelerator Research Organization); MIMASHI, Toshihiro (High Energy Accelerator Research Organization); SAKAMOTO, Yutaka (High Energy Accelerator Research Organization)

Presenter: MORI, Takashi (High Energy Accelerator Research Organization)

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