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Wed-Mo-Or10-03: Comparative studies of three-dimensional analysis and measurement for establishing pulse electromagnet design

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A new horizontal shift bump electromagnet for the J-PARC RCS injection bump system was designed and fabricated. The magnet is a pulse magnet that repeatedly excites a trapezoidal waveform of about 1.5 ms at 25 Hz. And it is possible to change of the rising and falling time of the pulse waveform with the maximum current of 16 kA and the voltage of 12 kV between 150 and 500 microseconds according to the optimum beam generation condition. In order to design the magnets of such specifications, three-dimensional dynamic magnetic field analysis capable of evaluating eddy currents is required. Using one electromagnet model, the difference between the static magnetic field analysis and the dynamic magnetic field analysis, and the difference between the two-dimensional and three-dimensional analysis were compared, respectively. In addition, we also verified the difference between the analysis result and the actual measurement result and so the difference of the magnetic field measurement method between the search coil and the hall probe and established a pulse electromagnet design method. The verification results by the fabricated electromagnet are presented here.

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