

Development of C-shape Dipole Electromagnet as an Electron Energy Spectrometer

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A dipole magnet is one of important components in particle accelerators. It can be used to bend the charged particle beam with desired deflection angle and direction. Moreover, it can be used as an energy spectrometer. This research focuses on development of a dipole electromagnet for measurements of energy and energy spread of electron beams that produced by the linear accelerator at the Plasma and Beam Physics Research Facility, Chiang Mai University. The main purpose of the research is to develop a dipole magnet with the deflecting angle of 60 degree for the electron beams with a maximum energy approximately 10 MeV. Two well-known computer programs Poisson and Radia are used to simulate 2D and 3D models, respectively. The optimized magnet prototype has a C-shape, which is convenient for installation in the accelerator beamline. It has a gap between the magnetic poles of 2.2 cm and can produce magnetic fields with the maximum magnetic fields intensity up to 0.35 T. The magnetic field deviation from the maximum value is less than 0.5 percent. To obtain the magnetic field value and deviation as required, the two conducting coils must have 1,300 winding turns with a maximum applied current of 5 A. This work has been supported by the CMU Junior Research Fellowship Program, and the Department of Physics and Materials Science, Faculty of Science, Chiang Mai University.

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