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Optimization of Current Transformers for Linear Accelerator System at PBP-CMU electron Linac Laboratory

A beam current transformer is one of the most important equipment for electron beam characterization in an accelerator system. The electron beam current can be evaluated from the induced pulse current from the current transformer when the electron beam passes through the transformer. The components of the transformer consist of a ferrite core wound with copper wire for magnetic field coupling and ceramic break with metal housing for image current bypass and magnetic field shielding. This research aims to optimize the number of turns of copper wire which is wound around the commercial ferrite core. For the optimization, a square waveform generator is used as a source of pulse beam. The generator can vary the duty cycle and has a minimum pulse width of 2 μs. The induced voltage pulse of the copper wire is recorded by oscilloscope and is compared with the input signal of the generator. The optimization results suggest that the uniform winding with 30 turns of copper wire provides the best induced pulse shape for these ferrite cores. The optimization results will be presented and discussed.

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