

Abstract Submitted
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Magnetic Field Table Approximations using Chebyshev Polynomials¹ PAUL ELLISON, Old Dominion University, MICHAEL TIEFENBACK, Thomas Jefferson National Accelerator Facility — At the Thomas Jefferson National Accelerator Facility (JLab) a pair of Linear Accelerators (LINACs) are in operation that are connected by two arcs in a racetrack design. The arcs of the accelerator beam line at JLab bend the electron beam using a set of dipole steering magnets. Measurements of magnetic field strength as a function of current were taken on these magnets and compiled into field tables in order to approximate the field intensity using a linear piece-wise interpolation, which is necessary for beam operation. The interpolation used to approximate the intensity introduces errors at currents where the field behaves non-linearly, and so the goal is to find physically reasonable supplementary points to fill in these tables to reduce the interpolation error, as well as to estimate the fit error of the approximation. This was done using a Chebyshev polynomial representation to make a smooth approximating function where the fit error could be easily estimated. The present error estimate is a work in progress and future work will include comparing the approximation to other interpolation methods, and taking into account hysteretic behavior at low operational currents.

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