

Abstract Submitted  
for the DNP15 Meeting of  
The American Physical Society

**Multipass Steering: A Reference Implementation**<sup>1</sup> MICHAEL HENNESSEY, McDaniel College, MICHAEL TIEFENBACK, Thomas Jefferson National Accelerator Facility — We introduce a reference implementation of a protocol to compute corrections that bring all beams in one of the CEBAF linear accelerators (linac) to axis, including, with a larger tolerance, the lowest energy pass using measured beam trajectory data. This method relies on linear optics as representation of the system; we treat beamline perturbations as magnetic field errors localized to regions between cryomodules, providing the same transverse momentum kick to each beam. We produce a vector of measured beam position data with which we left-multiply the pseudo-inverse of a coefficient array,  $A$ , that describes the transport of the beam through the linac using parameters that include the magnetic offsets of the quadrupole magnets, the instrumental offsets of the BPMs, and the beam initial conditions. This process is repeated using a reduced array to produce values that can be applied to the available correcting magnets and beam initial conditions. We show that this method is effective in steering the beam to a straight axis along the linac by using our values in elegant, the accelerator simulation program, on a model of the linac in question. The algorithms in this reference implementation provide a tool for systematic diagnosis and cataloging of perturbations in the beam line.

<sup>1</sup>Supported by Jefferson Lab, Old Dominion University, NSF, DOE

Michael Hennessey  
McDaniel College

Date submitted: 29 Jul 2015

Electronic form version 1.4