



The Cockcroft Institute
of Accelerator Science and Technology

FFS Trajectory Correction Algorithm & Plans

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Overview

An optimised orbit correction procedure for the ATF2 final focus using the quadrupole magnet movers and the cavity BPMs

Singular value decomposition (SVD) is used to 'pseudo-invert' the mover-BPM response matrix (details found in EPAC'08 paper and future report)

Mathematica and Dimad are the codes used, the Mathematica code runs Dimad

The Mathematica and Dimad roles may be filled by Matlab and Lucretia respectively

Code Steps

Mathematica v5.2



DIMADInput work package for Mathematica



Dimad input file



Dimad



Dimad output file



DIMADInput code



Mathematica

Implementation

Build Lattice



Add horizontal off-set of Δc to magnet mover 1



Record horizontal centroid position Δx at all BPMs



Repeat steps 2 and 3 for all magnet movers



Compile a response matrix 'R' ($\Delta x = R \cdot \Delta c$)



Use SVD to pseudo-invert R -> R_{inv}



Apply errors to simulation and record BPM readings



Calculate the mover off-sets that should correct the orbit ($\Delta c = -R_{inv} \cdot \Delta x$)

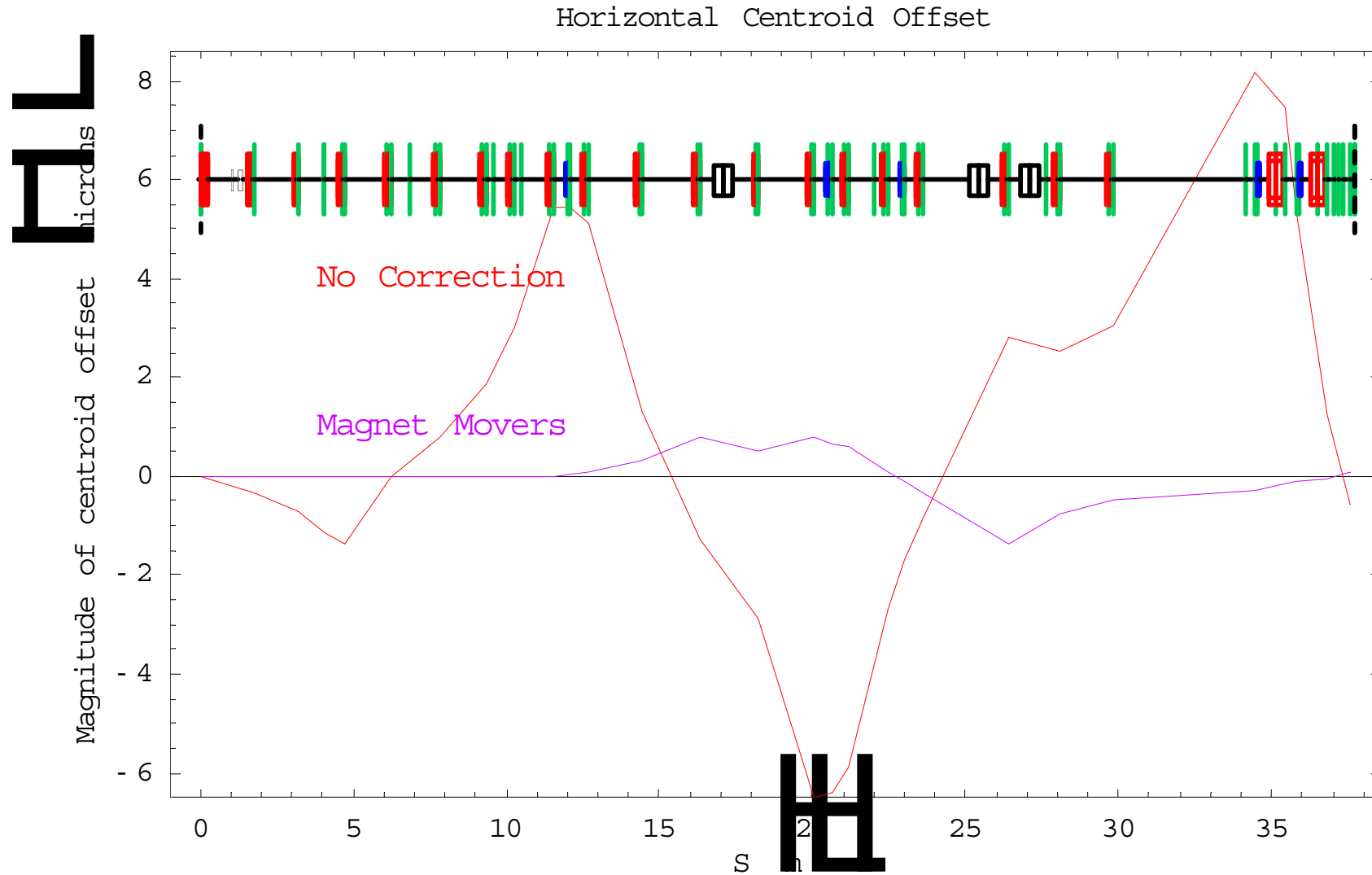


Apply the mover off-sets and the errors at the same time

Results: Single Iteration

Horizontal: 90.5% rms correction

Vertical: 94.1% rms correction



Lucretia Code Steps

Matlab

(need Lucretia lattice and error handling)



Lucretia input file

(need errors and particles)



Lucretia

(need output control options)



Lucretia output file

(need particle positions at BPM locations)



Matlab

(need SVD)

FS Code Steps

Matlab

(need mover name list)



Flight Simulator

(need mover control)



ATF2



Flight Simulator

(need BPM readings)



Matlab

(need SVD)