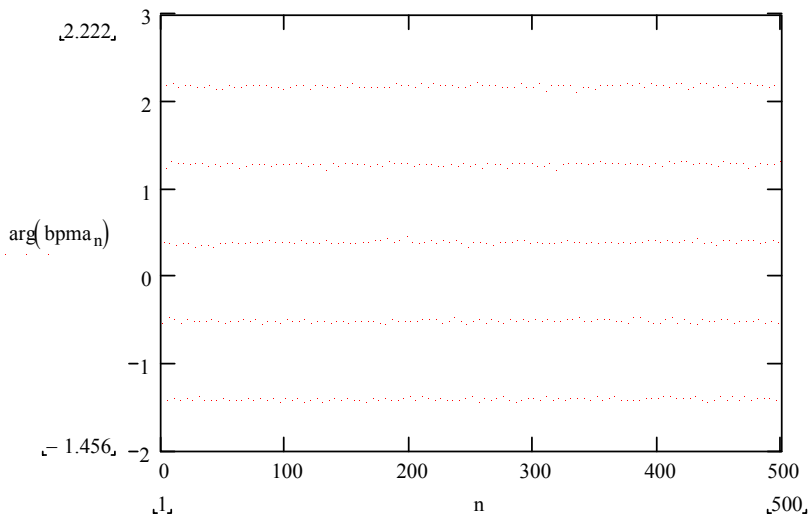
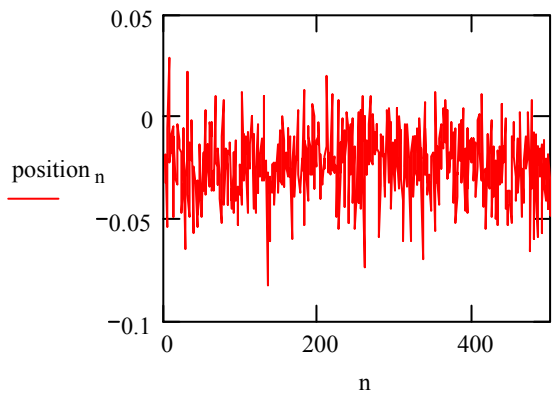
Uncoalesed Closed Orbit

$$\text{position}_n := 26\,\frac{\left|\text{bpma}_n\right| - \left|\text{bpmb}_n\right|}{\left|\text{bpma}_n\right| + \left|\text{bpmb}_n\right|}$$



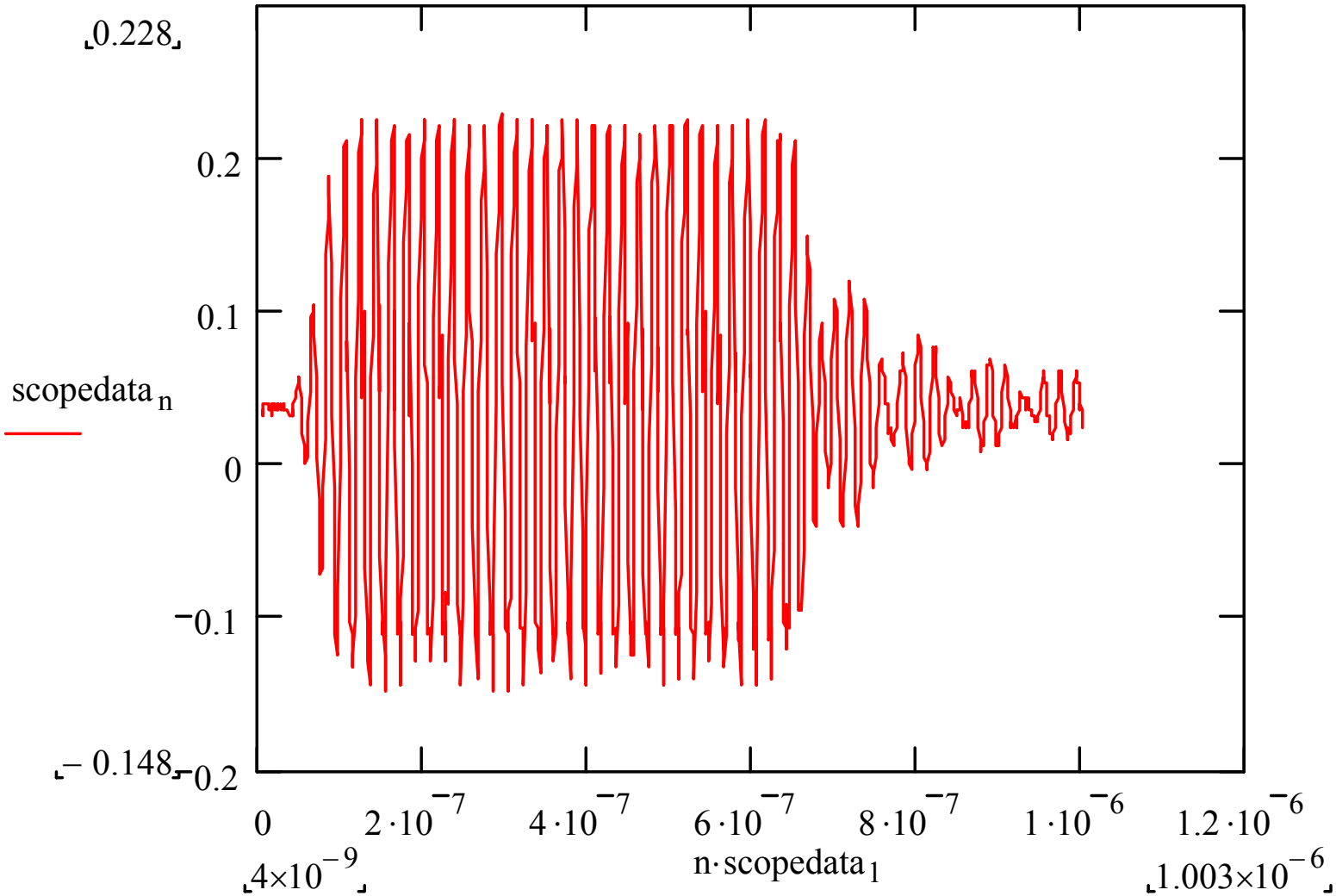


mean(amplitude) = 975.972

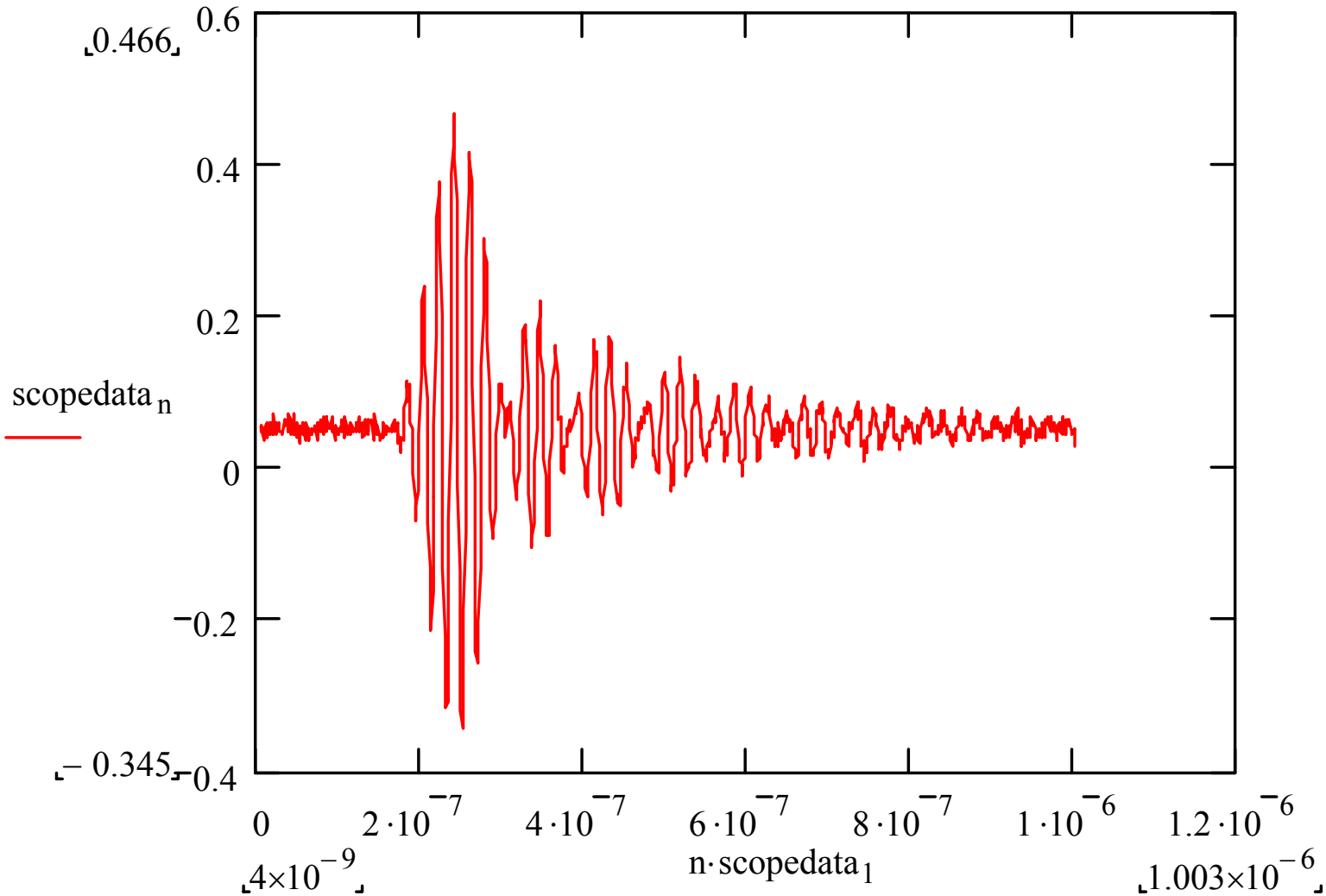
mean(position) = −0.023

Stdev(position) = 0.017

Uncoalesced Beam Signal

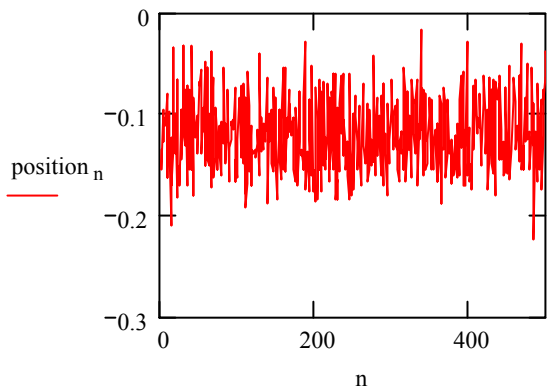


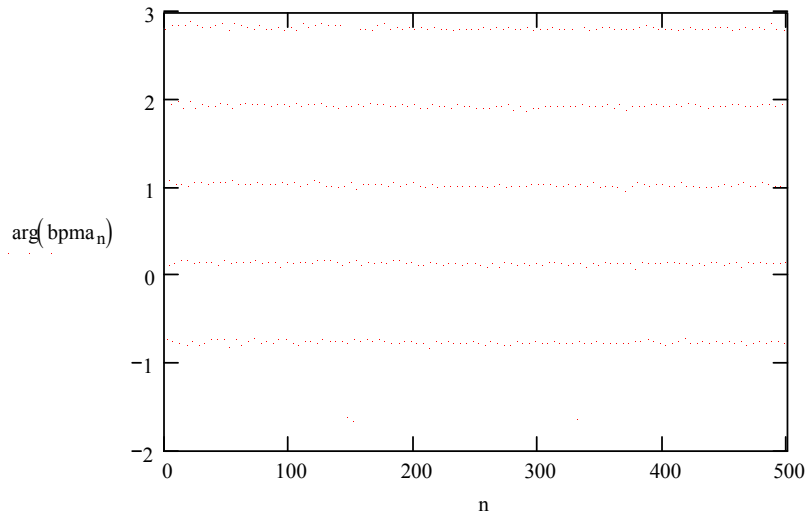
Single Bunch Beam Signal



Single Bunch Closed Orbit

$$\text{position}_n := 26\,\frac{\left|\text{bpma}_n\right| - \left|\text{bpmb}_n\right|}{\left|\text{bpma}_n\right| + \left|\text{bpmb}_n\right|}$$





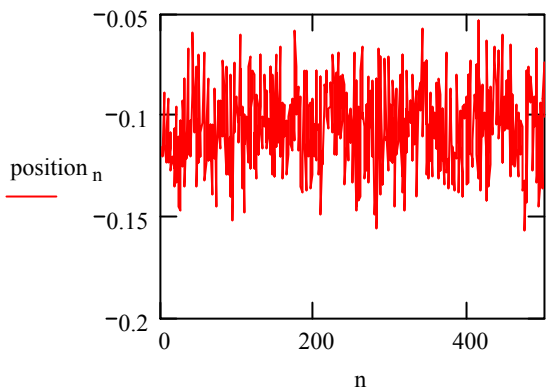
mean(amplitude) = 320.933

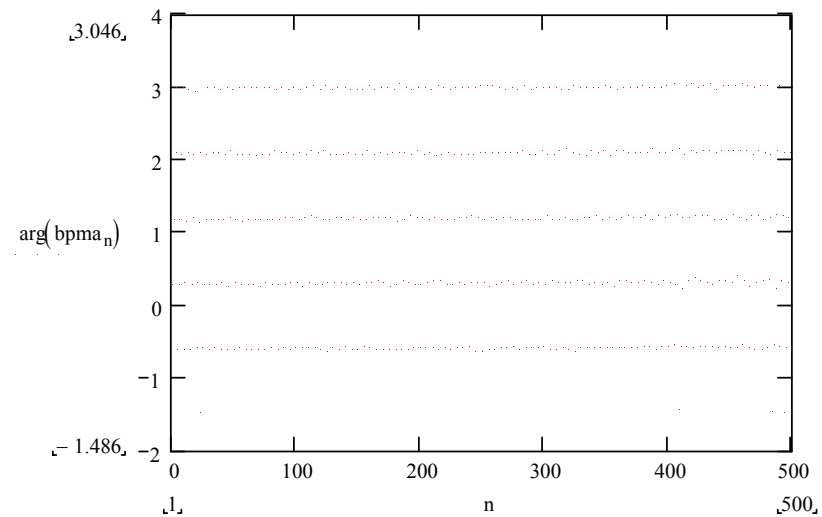
mean(position) = −0.12

Stdev(position) = 0.037

Two Bunches Closed Orbit

$$\text{position}_n := 26\,\frac{\left|\text{bpma}_n\right| - \left|\text{bpmb}_n\right|}{\left|\text{bpma}_n\right| + \left|\text{bpmb}_n\right|}$$





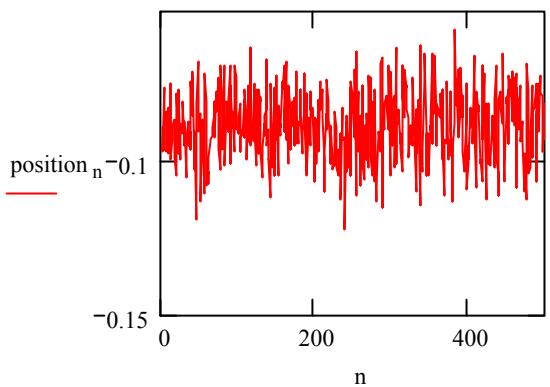
mean(amplitude) = 542.411

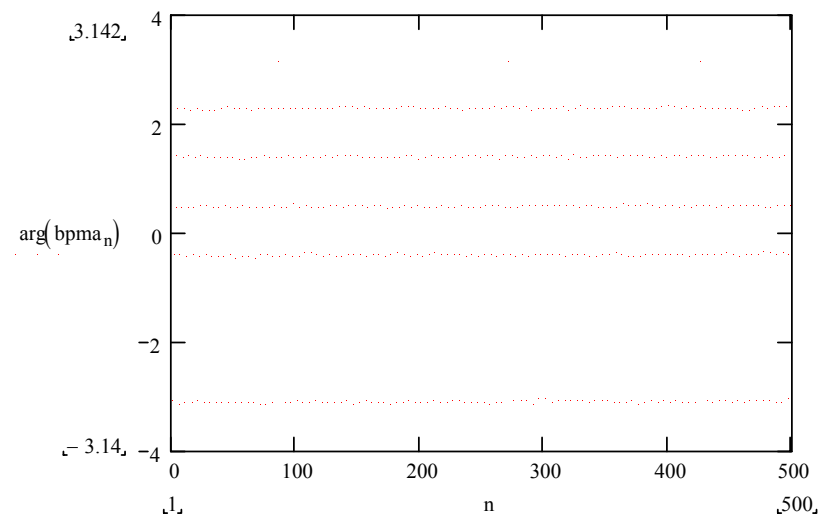
mean(position) = −0.105

Stdev(position) = 0.021

12 Bunches Closed Orbit

$$\text{position}_n := 26\,\frac{\left|\text{bpma}_n\right| - \left|\text{bpmb}_n\right|}{\left|\text{bpma}_n\right| + \left|\text{bpmb}_n\right|}$$





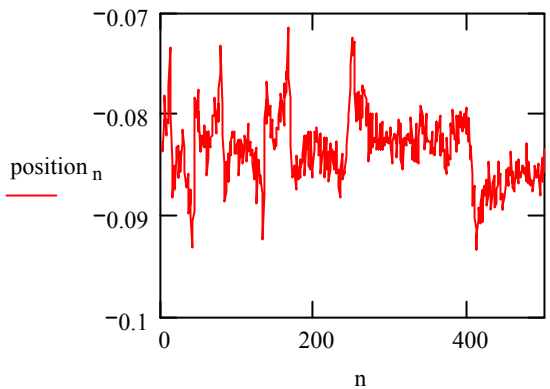
mean(amplitude) = 981.222

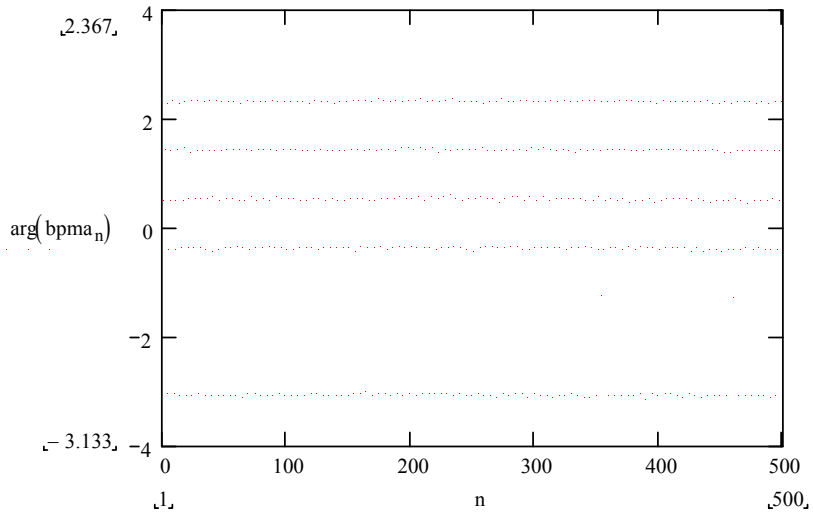
mean(position) = −0.088

Stdev(position) = 0.012

36 Bunches Closed Orbit

$$\text{position}_n := 26\,\frac{\left|\text{bpma}_n\right| - \left|\text{bpmb}_n\right|}{\left|\text{bpma}_n\right| + \left|\text{bpmb}_n\right|}$$



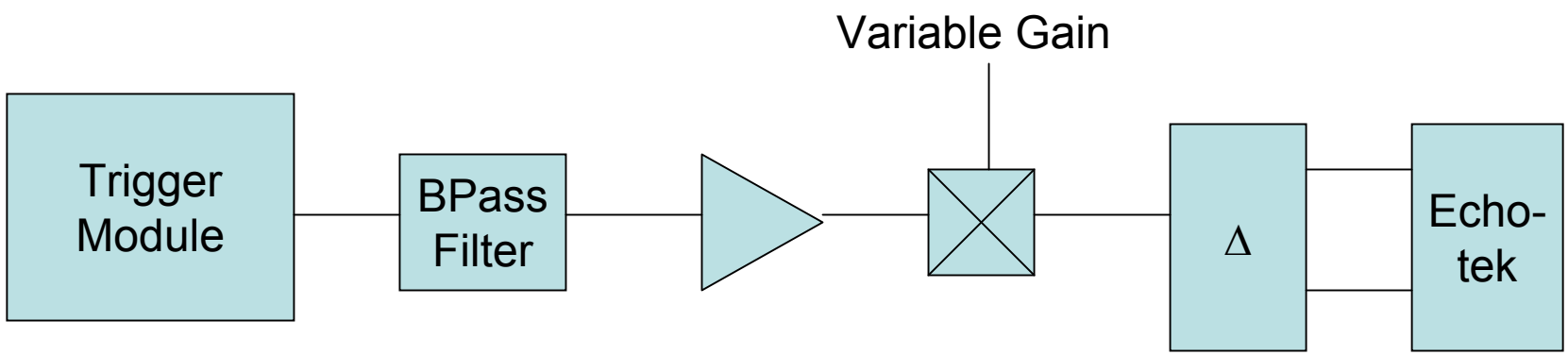


$\text{mean(amplitude)} = 8.418 \times 10^{3}$

$\text{mean(position)} = -0.083$

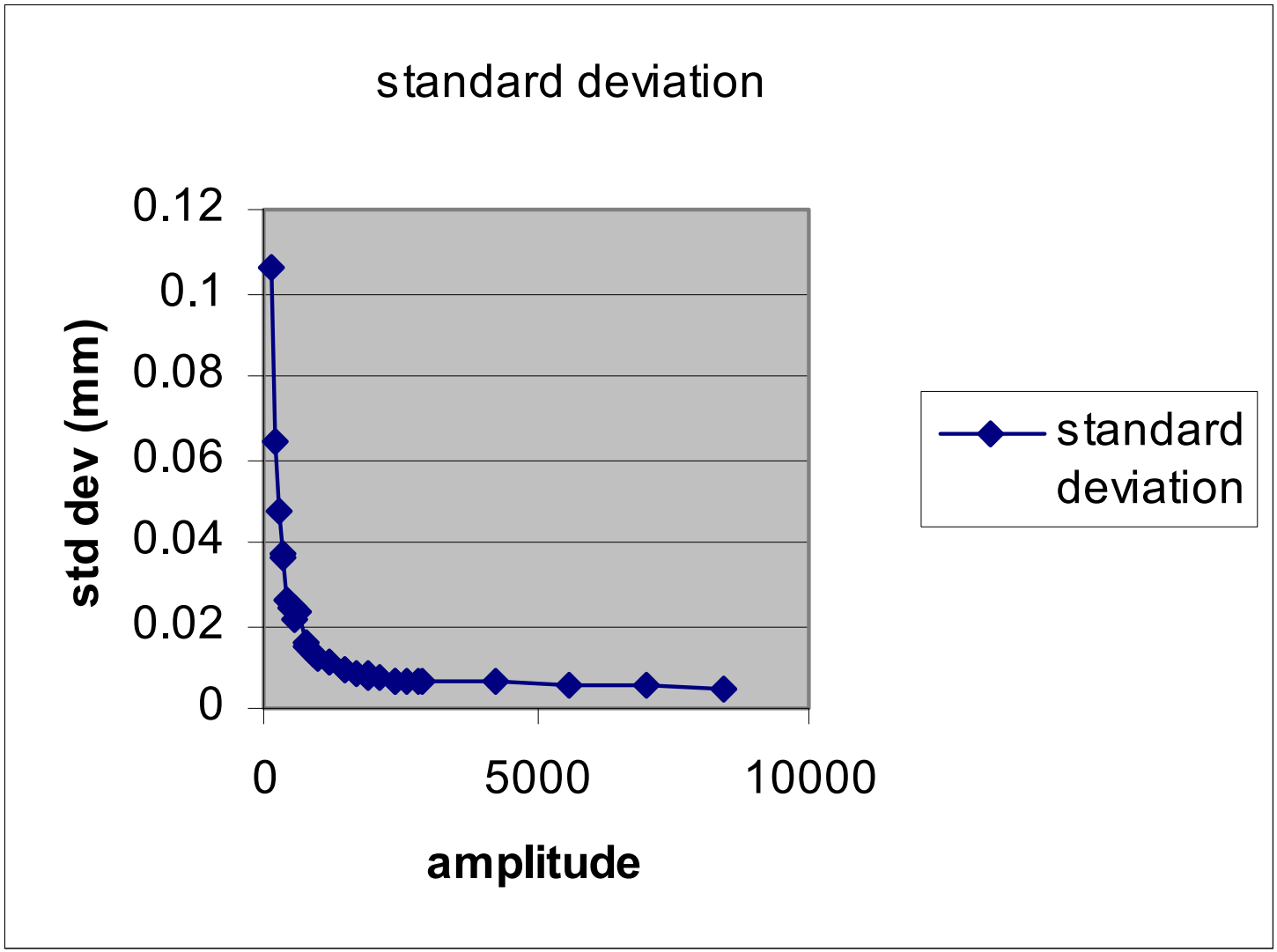
$\text{Stdev(position)} = 4.983 \times 10^{-3}$

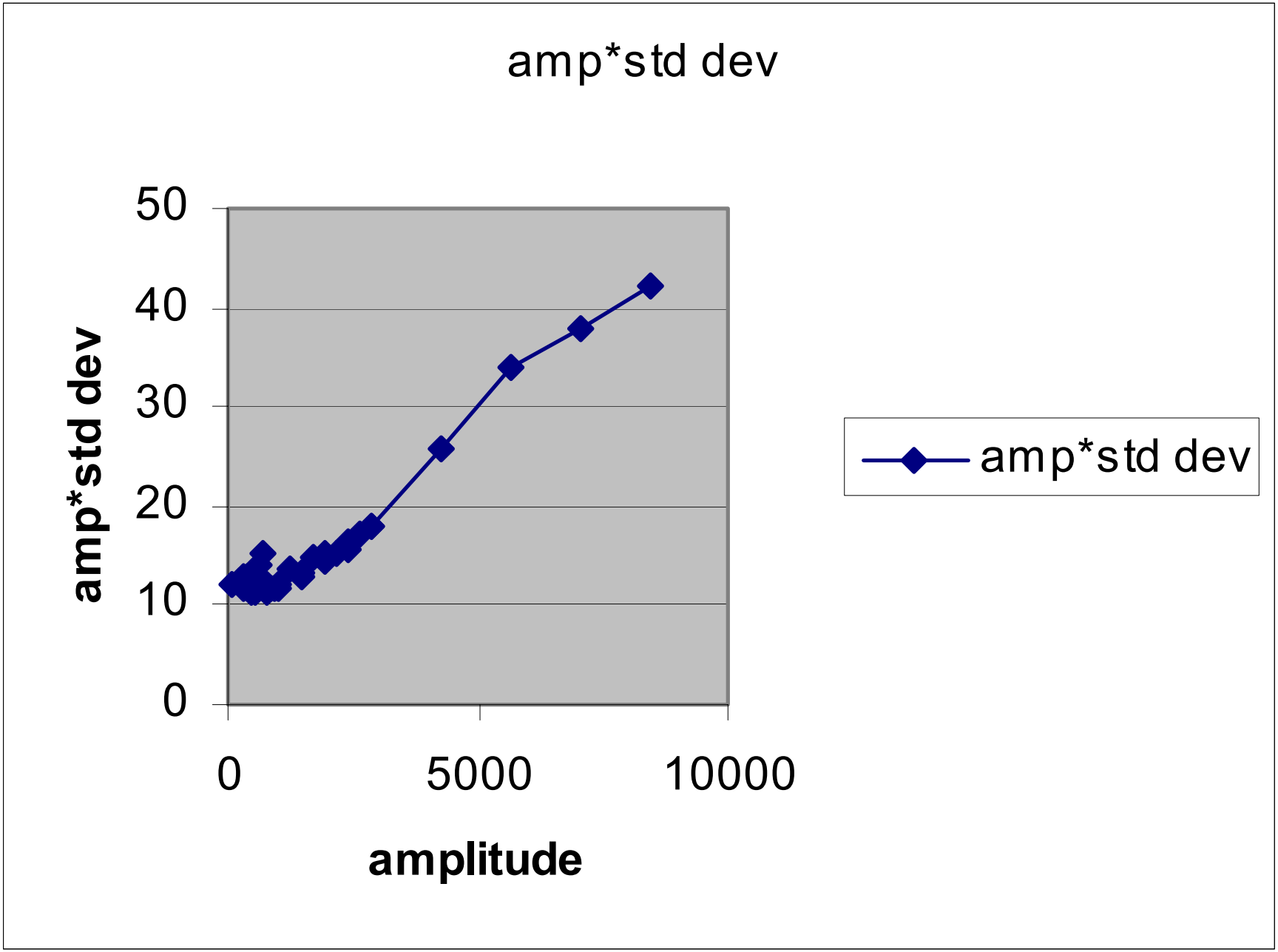
Closed Orbit Test Setup

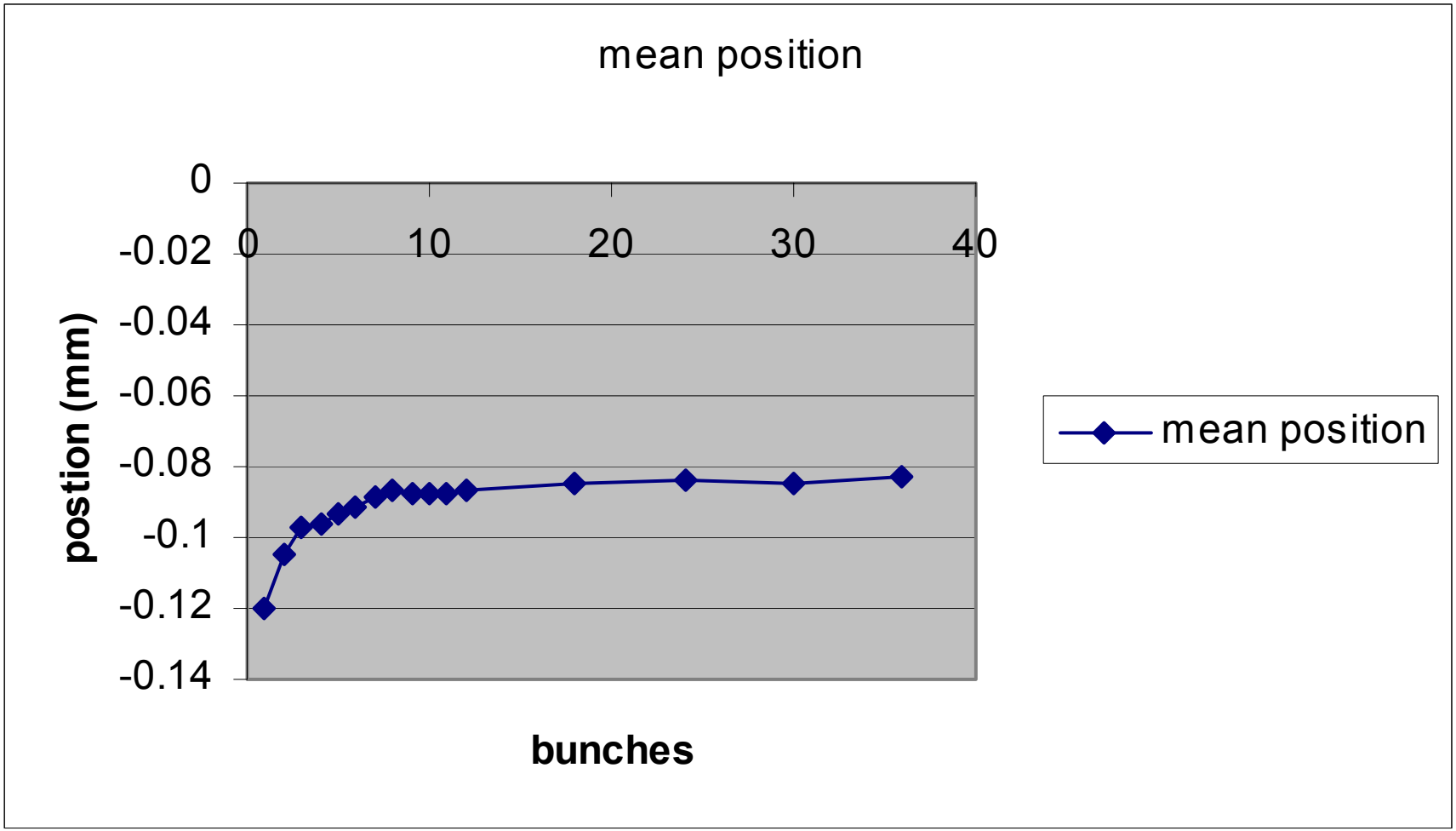


Adding 70 MHz Low Pass

- Position variation from 1 bunch to 36 bunches improved from 35μm to 10μm.
- Variation from 1 coalesced bunch to 30 uncoalesed bunches improved from 100μm to 35μm.
- Improvement points to aliasing as position variation problem.


standard deviation
0.12
0.1
0.08
0.06
0.04
0.02
0
std dev (mm)
0
5000
10000
amplitude
standard deviation


amp*std dev
50
40
30
20
10
0
amp*std dev
0
5000
10000
amplitude
amp*std dev


mean position
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
-0.14
0
10
20
30
40
postion (mm)
bunches
mean position