I did some analysis and realized that I had assumed that *c* would be negative. So the equation has been slightly modified.

This is also only the ‘top’ half of the pulse, between v0 and v0 +Δv, not between v0 and v0 –Δv.

So Δx between v0 ±Δv. Is:

I ran the tuning program with a=±0.01, B=0.0093, v\_0=3.23e7, d\_tot=0.08, d\_w=0.06 and these are the results

 Figure

Here the tuning program is plotting the absolute value of the pulse width. The analytical approximation I have for the pulse width is fairly accurate for the first set of curves. I thought this might be because of a small angle approximation I made (tanθ=θ). But I plotted the equation without that approximation and it still only matched the first set of curves.

The assumption that is causing the curves to only match for a certain set is that the acceleration in the filter is:

This does not take into account the periodic path inside the filter, but only models the acceleration for small values of Ed.

The disappointing part is that within the range of this scan. There are two positions that can get Δx to about 1e-5 m as opposed to 4e-4 (the minimum of the red line) around c=±4.26

This following graph shows the periodicity of Δx for a wide range of c, this time without absolute value.



Figure

Zoomed in at the center we have:



My analytical equation will give us the minimum at A, but ideally we could get an equation to represent the either of the two spots where Δx crosses 0.