

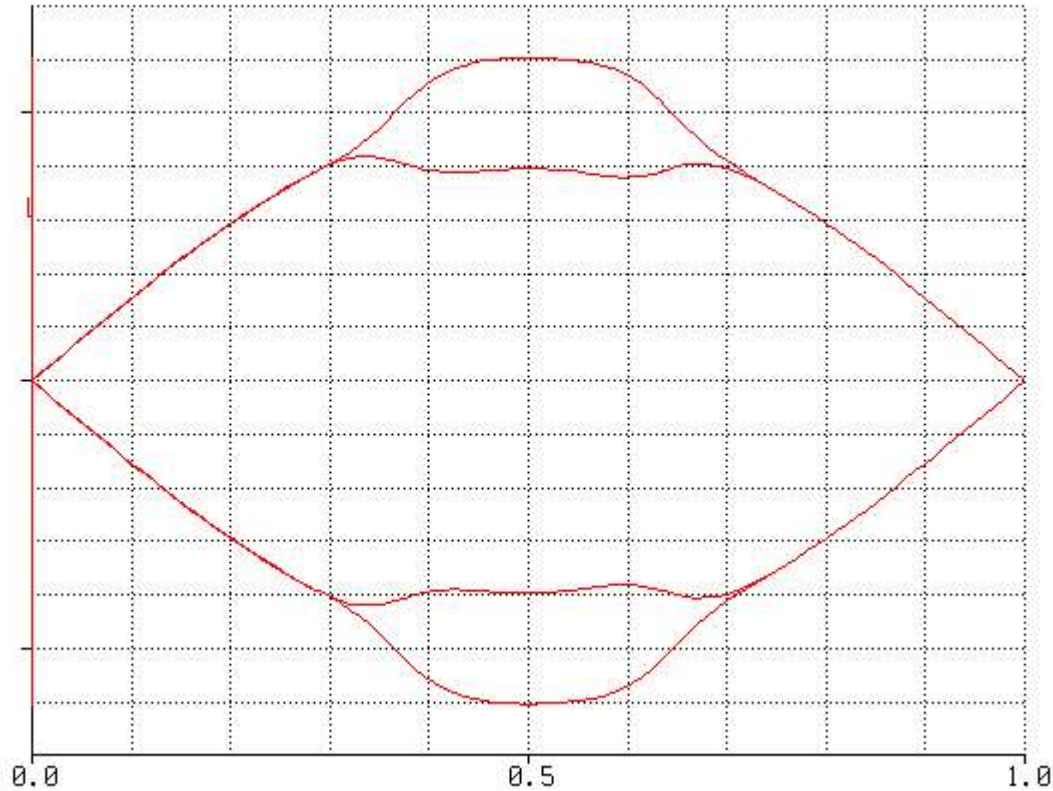
Computing effect of cross talk using Convolution

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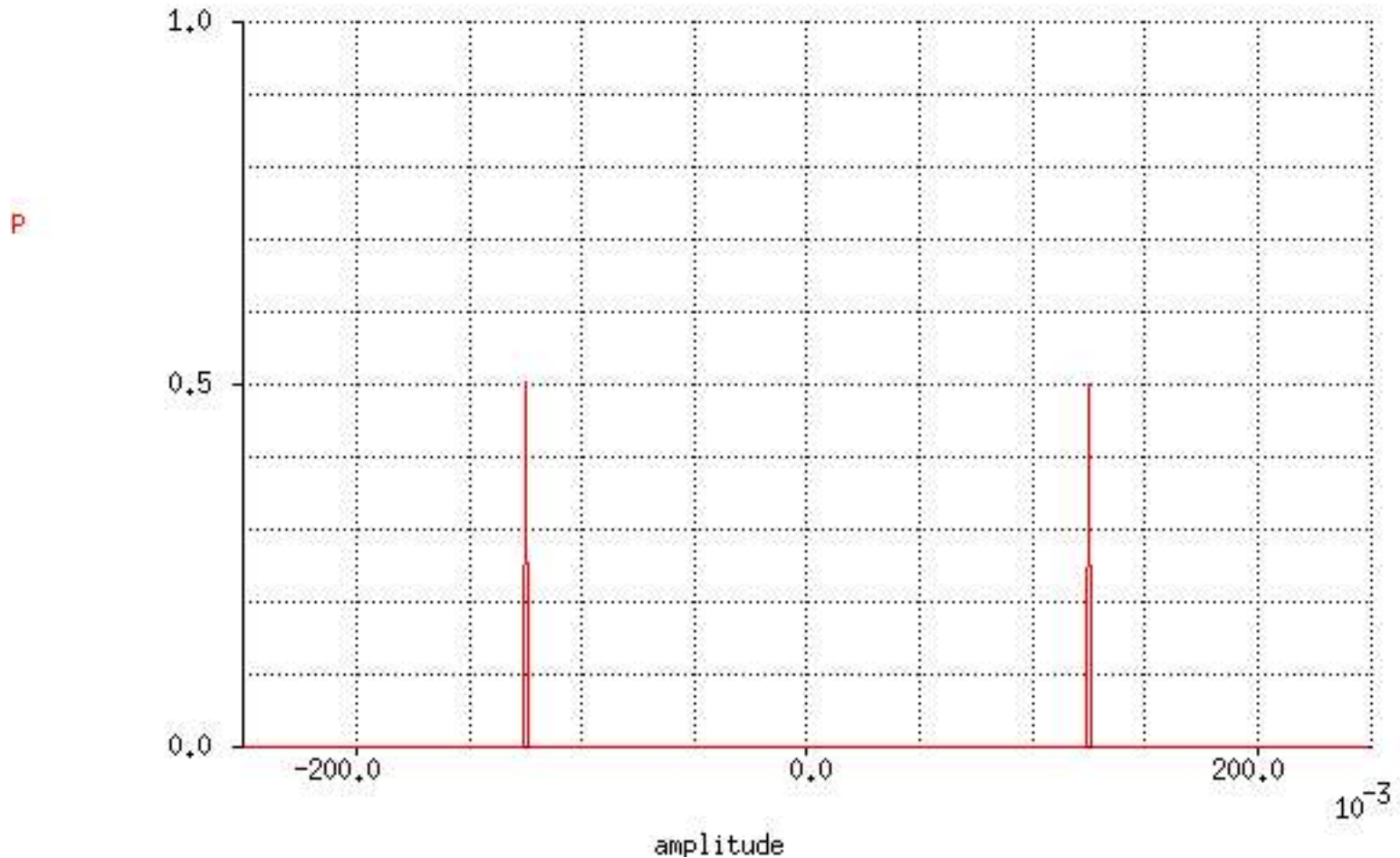


Agilent Technologies

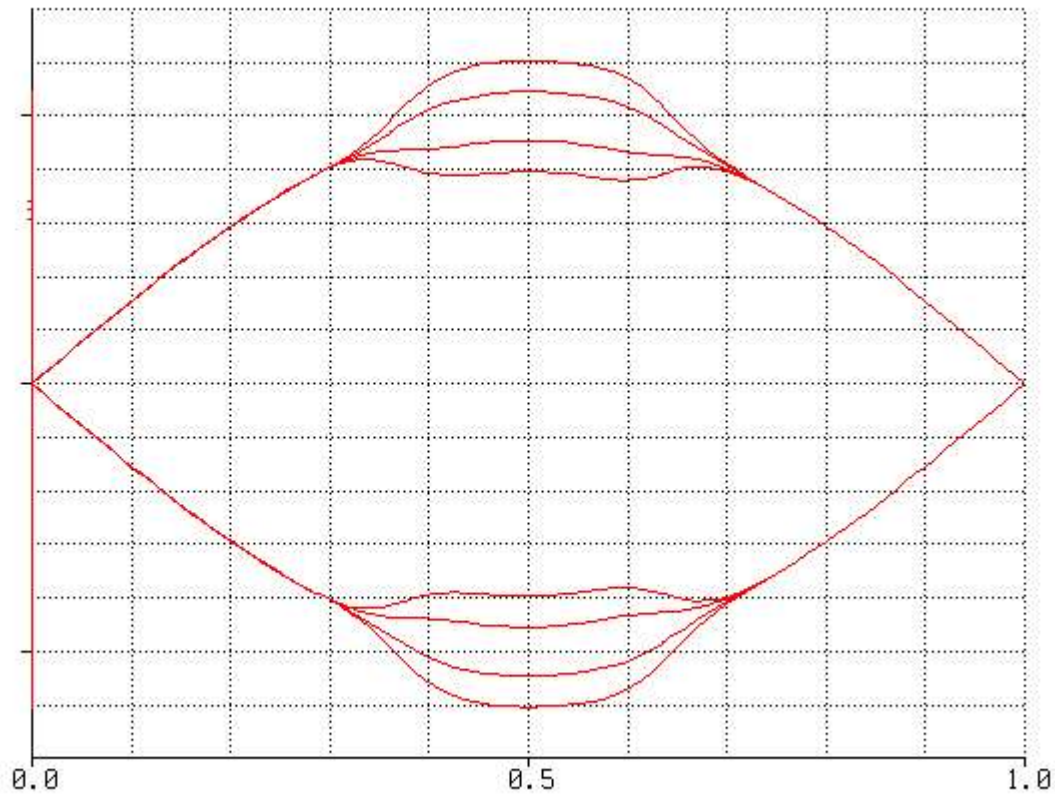
Cross Talk due to a single pulse about .3UI wide



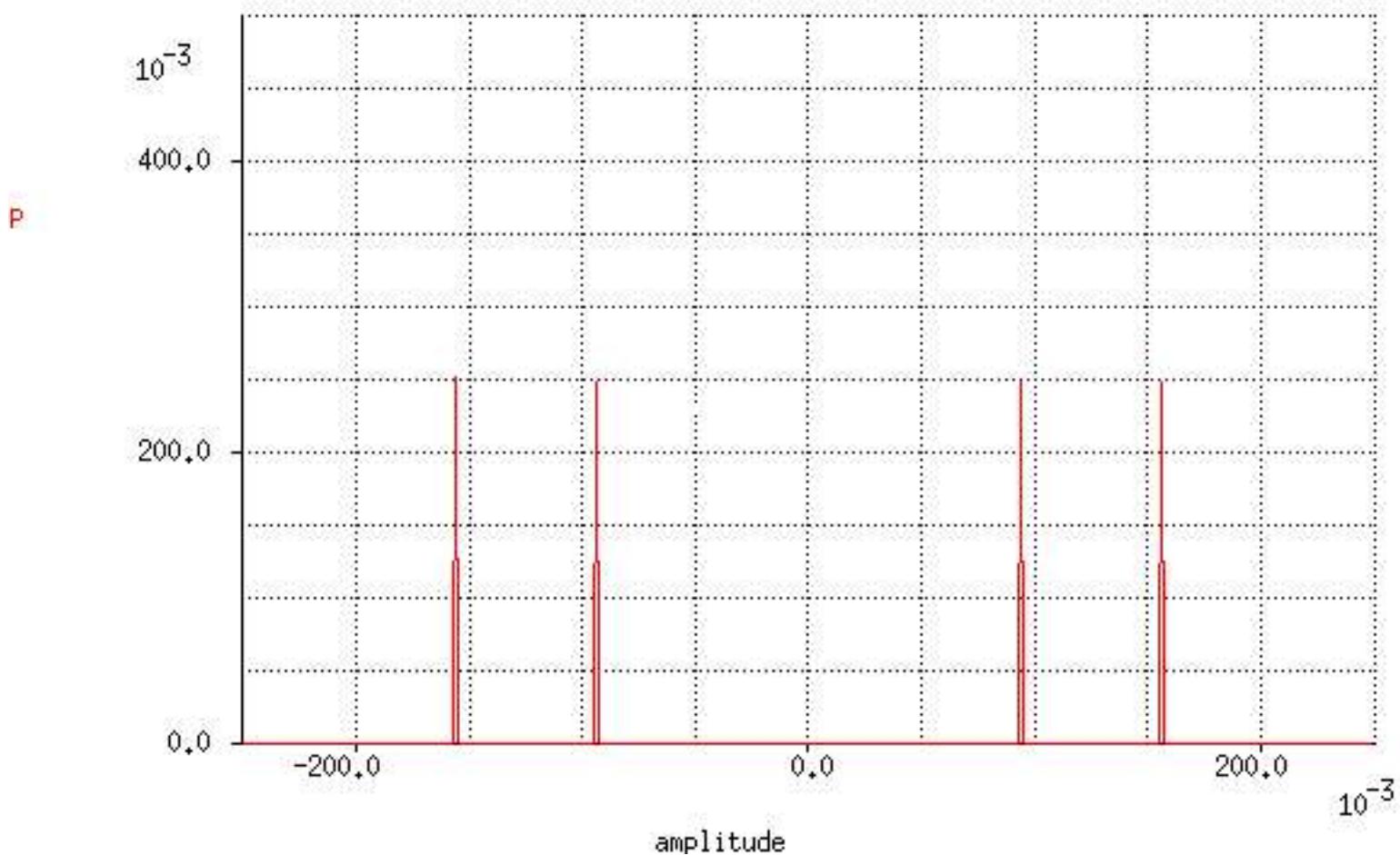
PDF of Cross Talk at center of EYE Looks like this



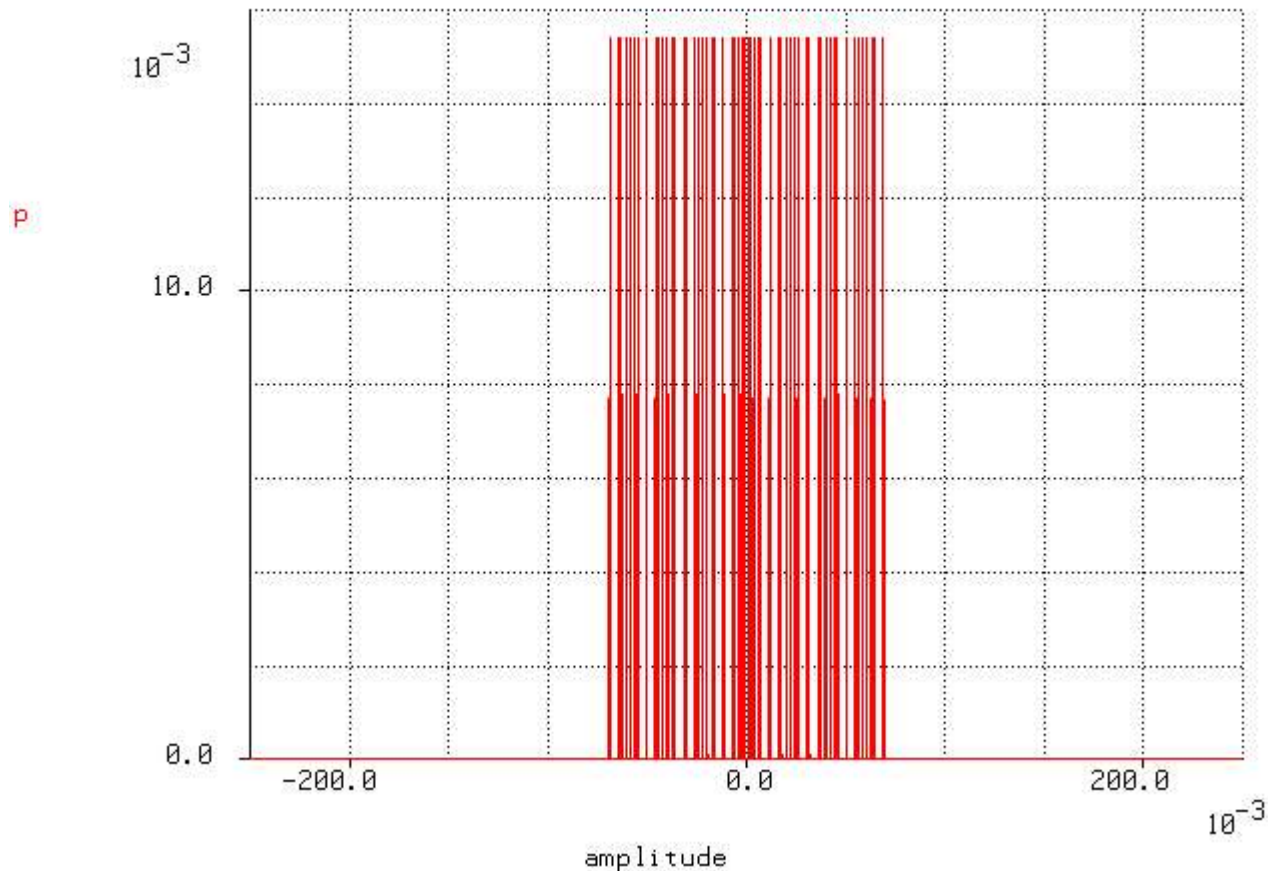
If there are 2 pulses, each about $.3UI$ coupling to the center of the EYE



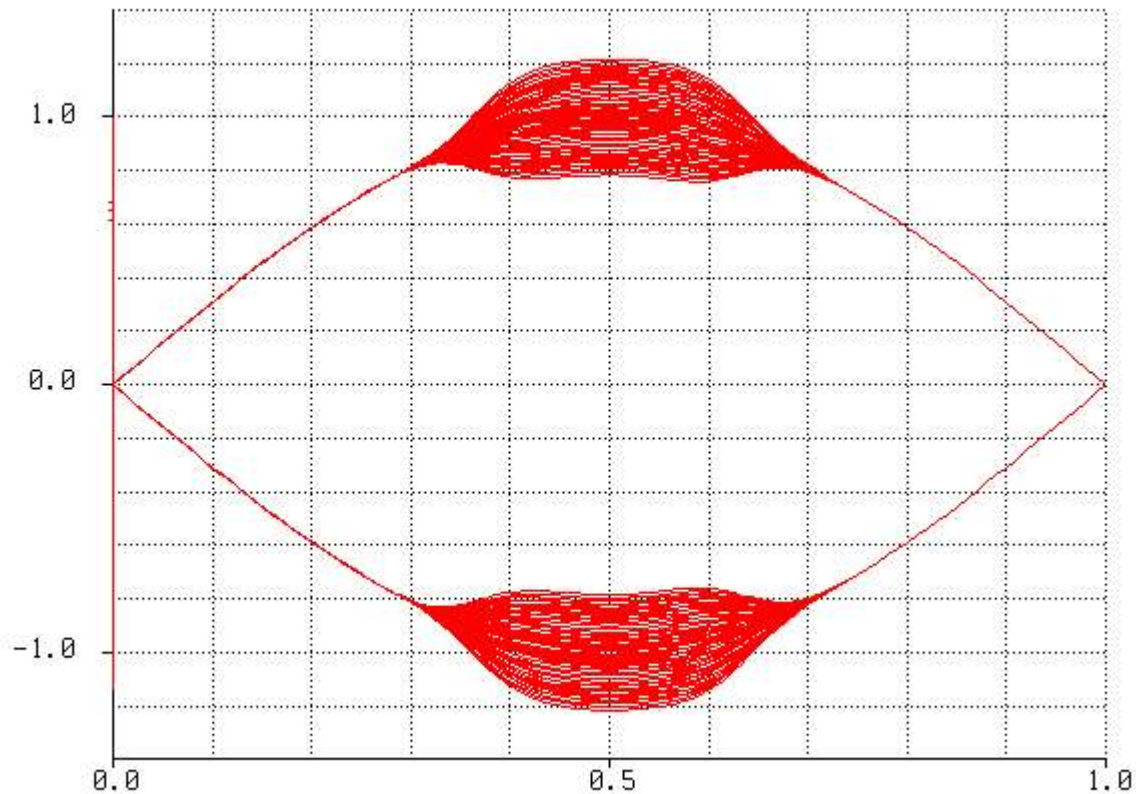
PDF of Cross Talk at center of EYE Looks like this



And if 6 pulses combine, the PDF of Cross Talk at center of EYE could look like this:



With the EYE looking like this



The number of spikes for N crosstalk pulses is 2^N

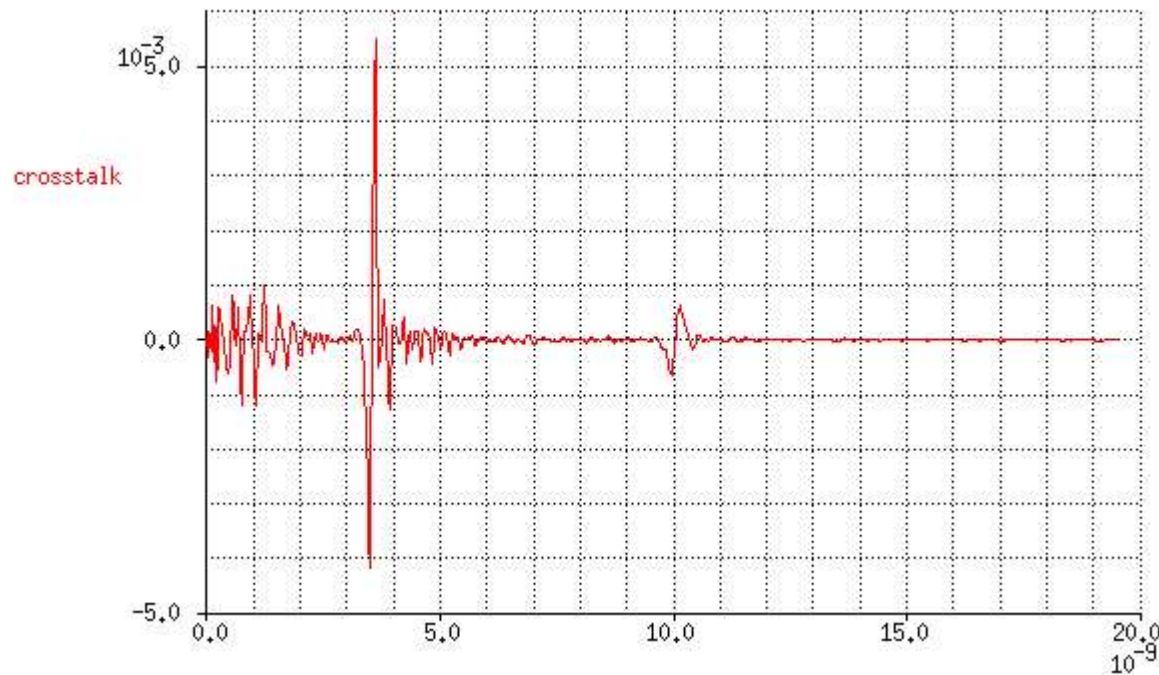
Clearly for N moderately large it will be best to smear out the spikes and get a continuous PDF.

Smearing will exist due to thermal noise etc.

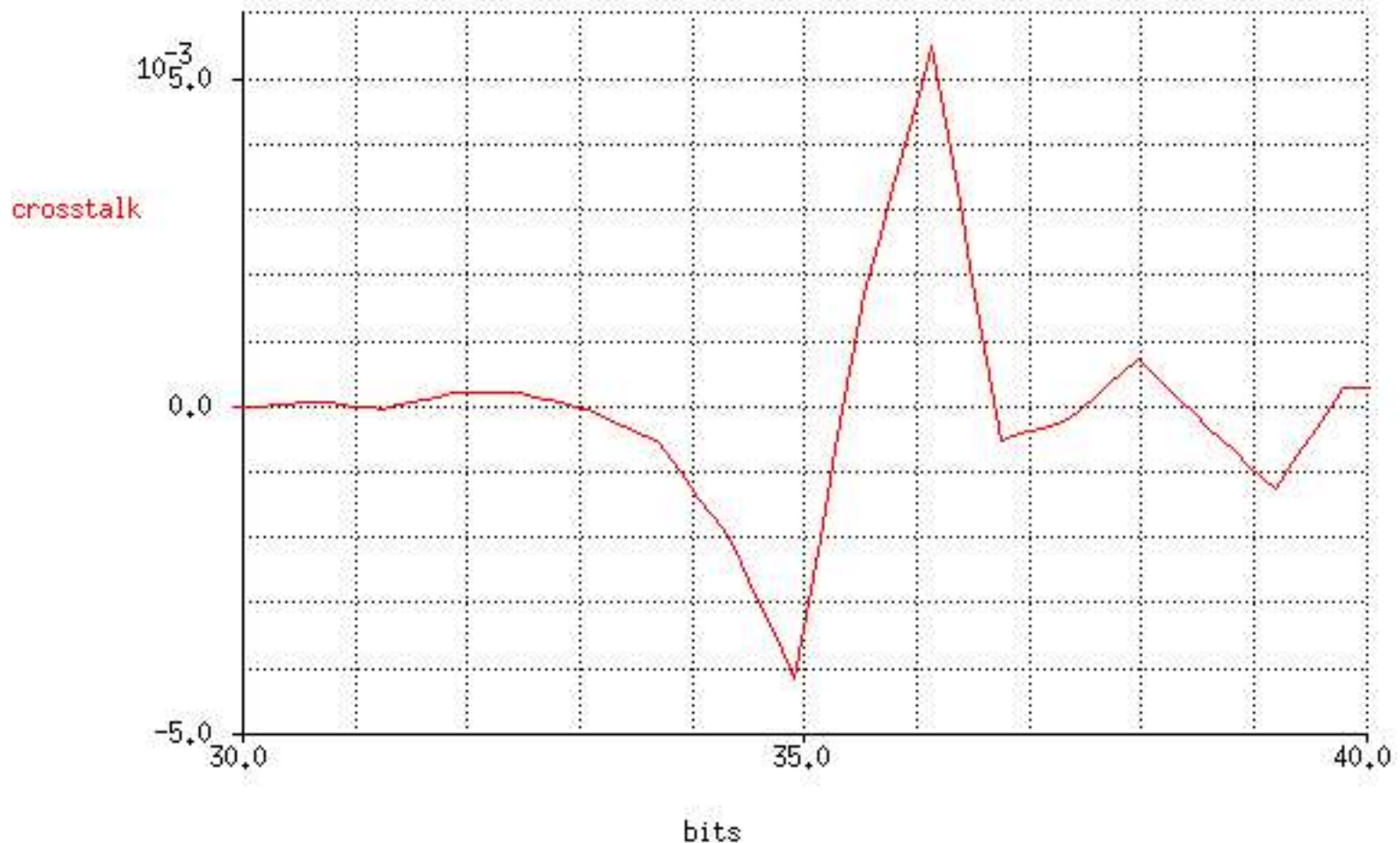


How many contributors to cross talk are there?

Looking at an example: d'Ambrosia Case2FM13SI20N1D13L10.s4p shows that there are many:



Zooming in on a small region we see all crosstalk at all phases of a data period.

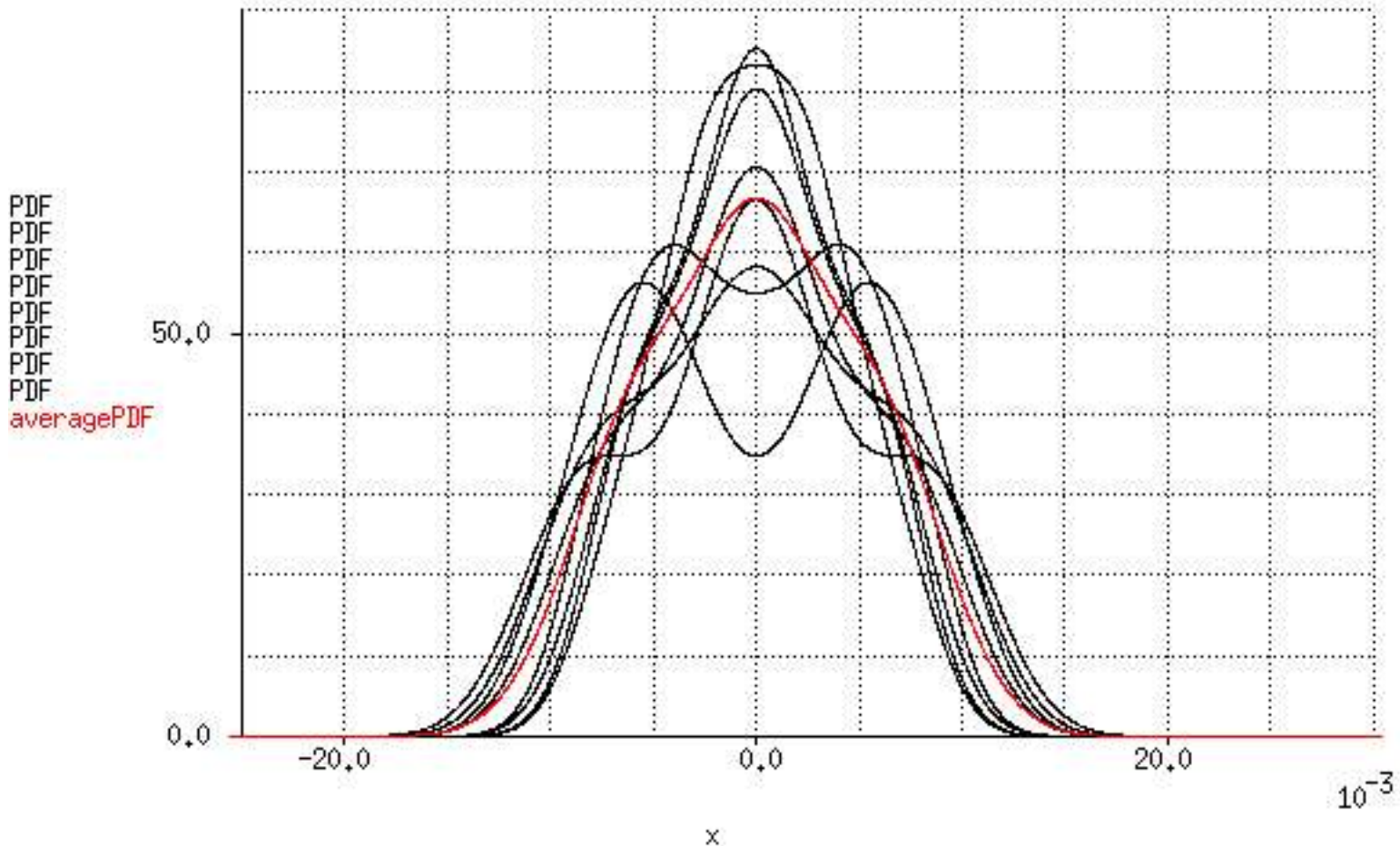


To compute crosstalk we can:

1. Select the Cursor time and sample the crosstalk at each bit period starting there
2. Compute in the (impulse) PDF of crosstalk due to each sample
3. Convolve and blur to get a continuous PDF of crosstalk for that sample set.
4. Shift the initial sampling point by a small amount (I use 1/8 bit period) and re-sample and find a new continuous PDF, repeating until the original phase is reached
5. Average the continuous PDFs to get the average PDF over all phase relationships between data and crosstalk.



- Here are the PDFs I computed for d'Ambrosia Case2FM13SI20N1D13L10.s4p

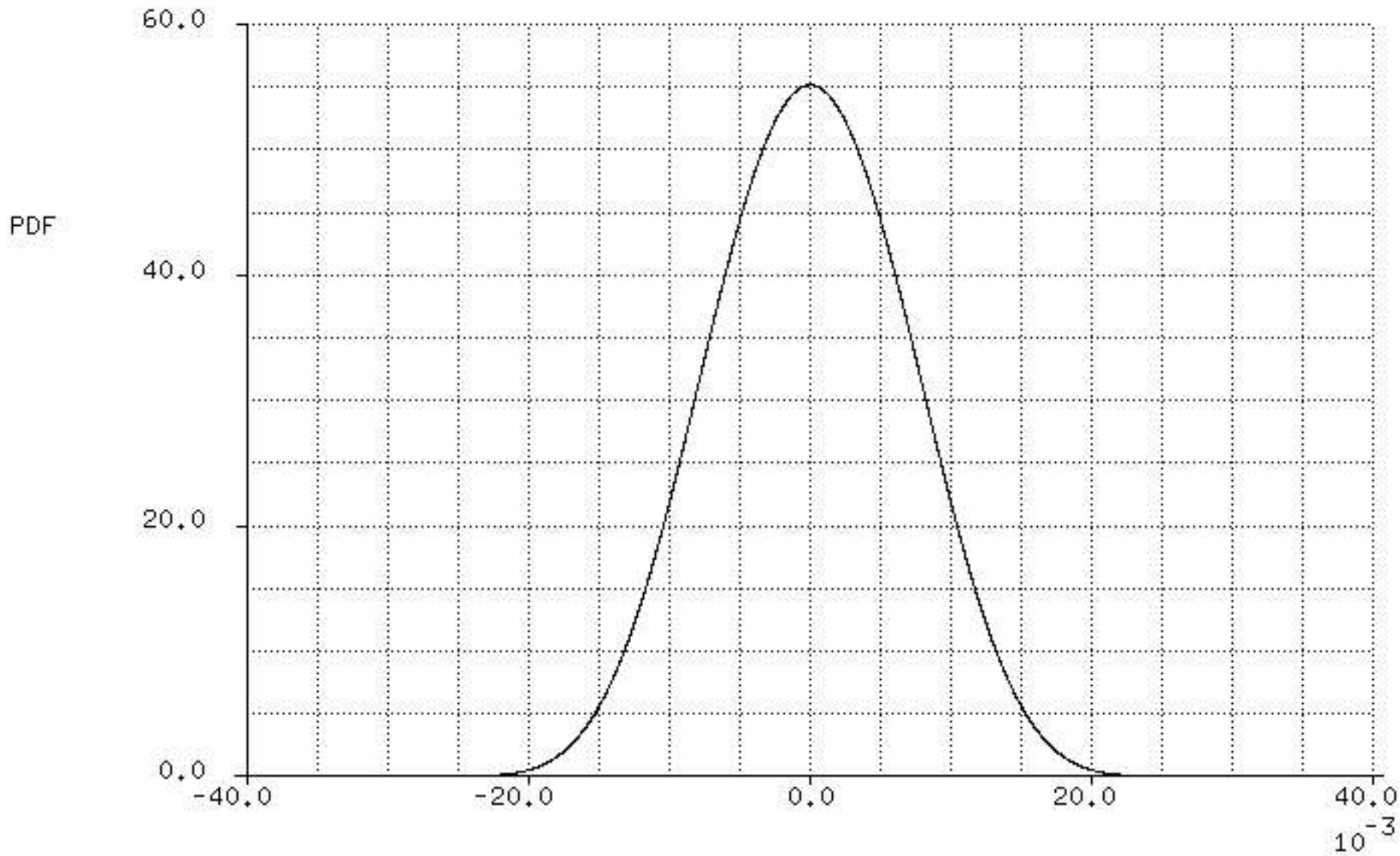


There will be multiple paths of crosstalk. These are easily combined by convolving PDFs.

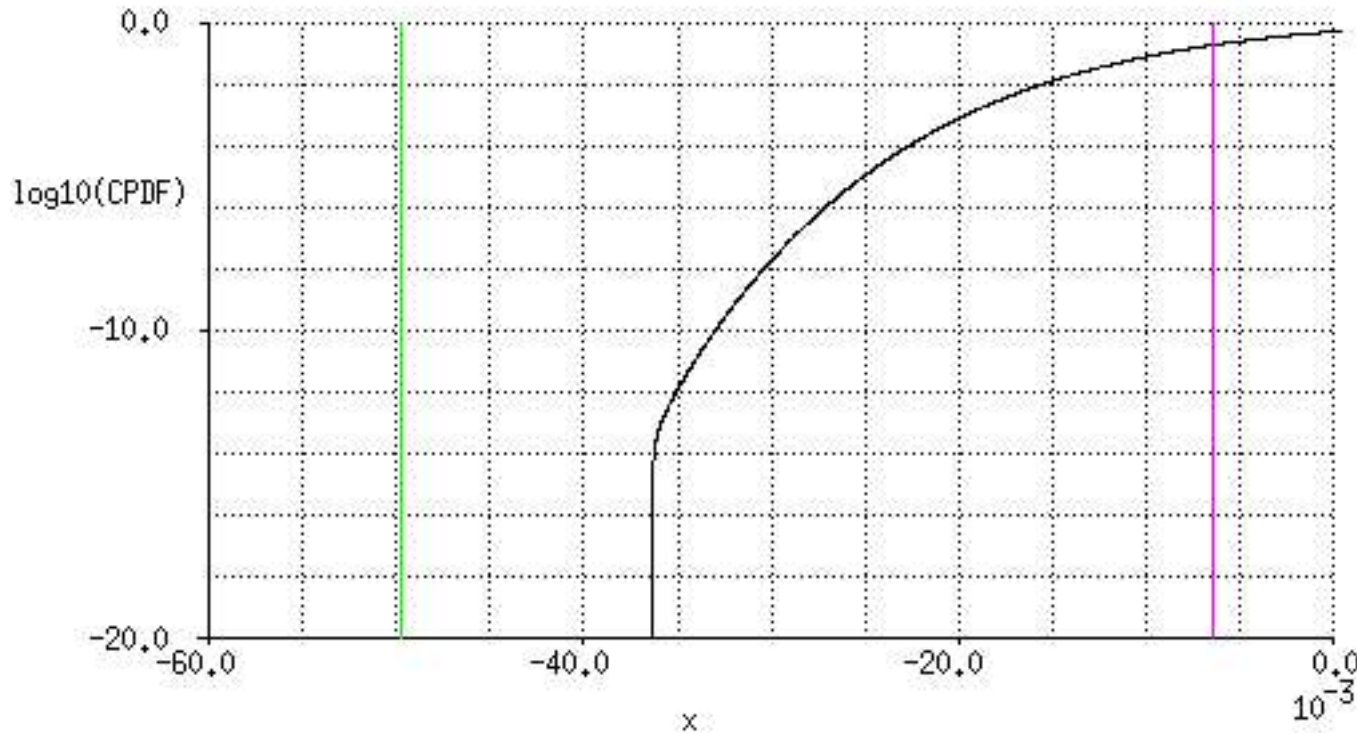
Next slide shows the combined PDF for d'Ambrosia:

- 1.Case2FM13SI20N1D13L10.s4p
- 2.Case2FM13SI20N2D13L10.s4p
- 3.Case2FM13SI20FD13L10.s4p





- What is of real interest is the cumulative probability function:



Maximum sum of magnitudes samples

Root sum-of-squares of peak magnitude

note: Roundoff errors in convolution math limit CPF computation accuracy to around 10^{-12}

Obligatory Conclusions slide

- **This is “the right way” to compute the effect of cross talk.**
- **This method assumes that time domain cross talk information exists.**
- **There may be an easier, easier to describe way. If so this method can be used as a check.**
- **This method may be easy enough.**

