The Eye Pattern

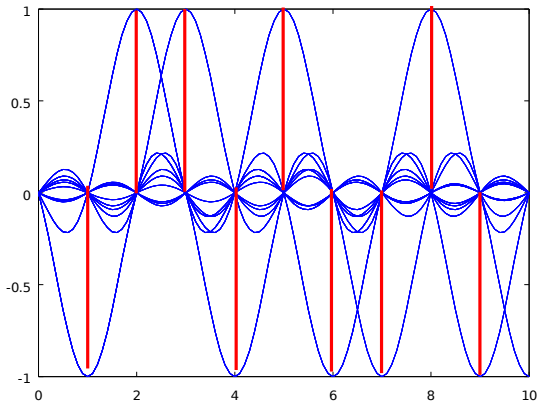
Young W. Lim

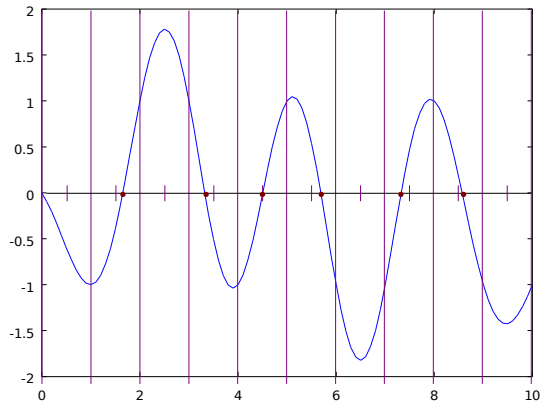
November 28, 2013

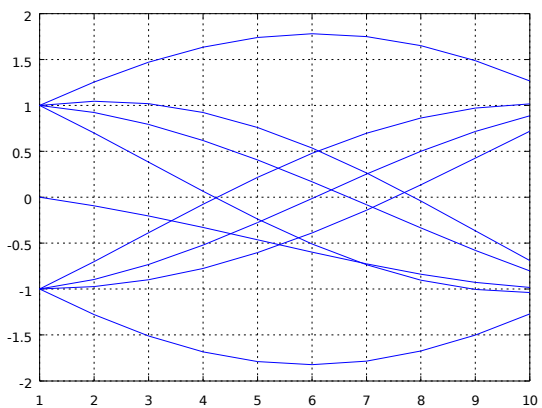
The Eye Pattern

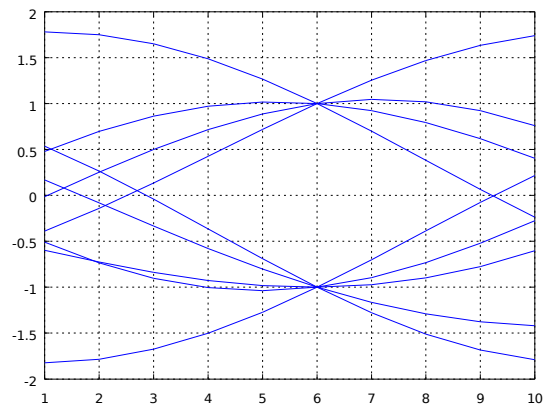
- synchronized superposition of successive symbol intervals
- of the distorted waveform
- appearing at the output of the receive-filter
- prior to thresholding

The Eye Pattern Example









Timing Features

- Optimum sampling time
  - the width of the eye opening
  - when the eye opening is the widest
- Zero-crossing jitter
  - the timing signal is extracted from the zero-crossings of the waveform
- Timing sensitivity
  - determined by the rate at which the eye pattern is closed a the sampling time is varied

The Peak Distortion

- An eye opening of unity
  - zero intersymbol interference
- An eye opening of zero
  - completely closed eye pattern
  - intersymbol interference is severe
  - some upper traces in the eye pattern to cross with its lower traces
- An eye opening of 0.5 or better
  - yield reliable data transmission

The Peak Distortion D_{peak}

- Eye opening $= 1 - D_{peak}$
  - peak distortion D_{peak}
  - max value assumed by the ISI over all possible transmitted sequences
  - with this evaluation divided bya normalization factor
  - the absolute value of the corresponding signal level
  - idealized for zero ISI
- Zero peak distortion - when the eye opening is unity
- Unity peak distortion - when the eye pattern is completely closed
  - determined by the rate at which the eye pattern is closed a the sampling time is varied

Reference

[1] S. Haykin, M Moher, “Introduction to Analog and Digital Communications”, 2ed