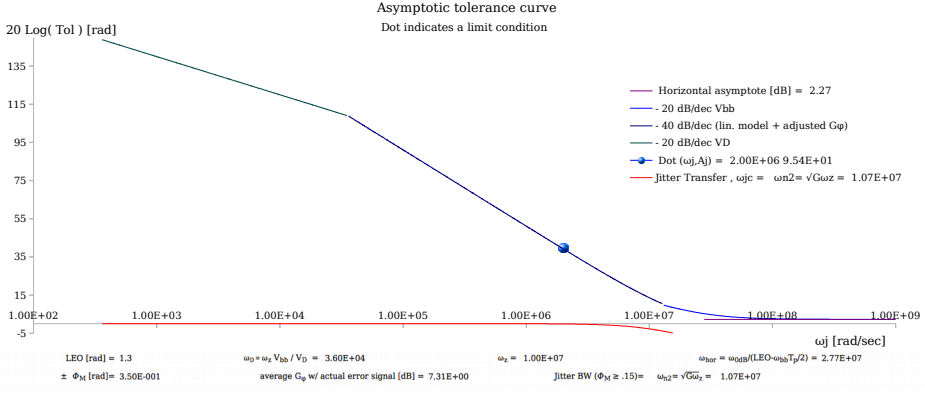
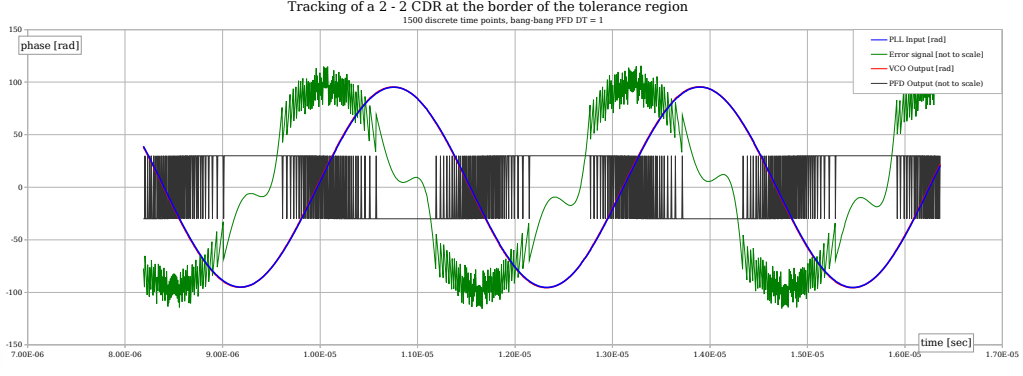

Asymptotic tolerance curve
Dot indicates a limit condition
20 Log( Tol ) [rad]
135
115
95
75
55
35
15
-5
1.00E+02
1.00E+03
1.00E+04
1.00E+05
1.00E+06
1.00E+07
1.00E+08
1.00E+09
ωj [rad/sec]
Horizontal asymptote [dB] = 2.27
- 20 dB/dec Vbb
- 40 dB/dec (lin. model + adjusted Gφ)
- 20 dB/dec VD
Dot (ωj,Aj) = 2.00E+06 9.54E+01
Jitter Transfer , ωjc = ωn2= √Gωz = 1.07E+07
LEO [rad] = 1.3
ωD = ωz VBB / VD = 3.60E+04
ωz = 1.00E+07
ωhor = ω0dB/(LEO-ωbbTp/2) = 2.77E+07
± ΦM [rad]= 3.50E-001
average Gφ w/ actual error signal [dB] = 7.31E+00
Jitter BW (ΦM ≥ .15)= ωn2= √Gωz = 1.07E+07


Tracking of a 2 - 2 CDR at the border of the tolerance region
1500 discrete time points, bang-bang PFD DT = 1
phase [rad]
150
100
50
0
-50
-100
-150
7.00E-06
8.00E-06
9.00E-06
1.00E-05
1.10E-05
1.20E-05
1.30E-05
1.40E-05
1.50E-05
1.60E-05
1.70E-05
time [sec]
PLL Input [rad]
Error signal [not to scale]
VCO Output [rad]
PFD Output (not to scale)