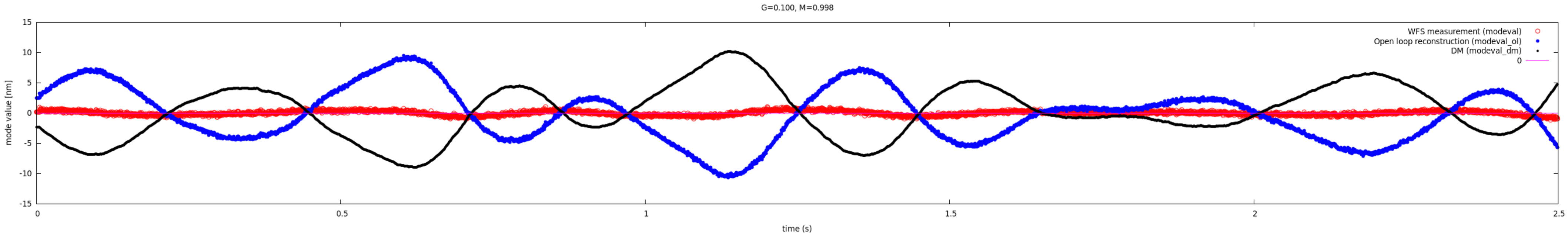
Open loop reconstruction

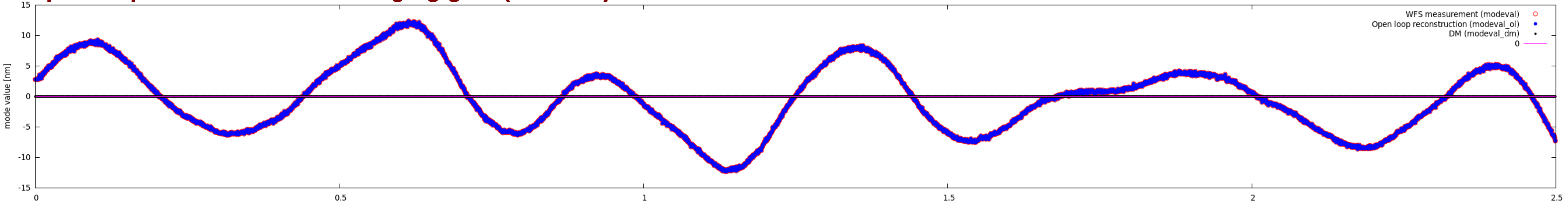
Turbulence injected:
8m/s wind speed, slightly filtered Kolmogorov spectrum (LOcoeff=0.1), 50nm RMS on DM (100nm WF), speed = 8 m/s
written to DM every 300us (3.333 kHz frequency)

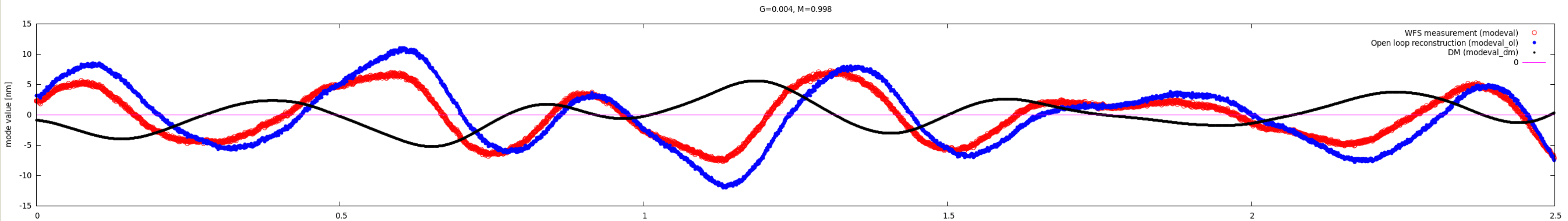
Showing **Open loop (blue)** and **WFS measured (red)** modal coefficient #30
Data acquition start synchronized to turbulence sequence start

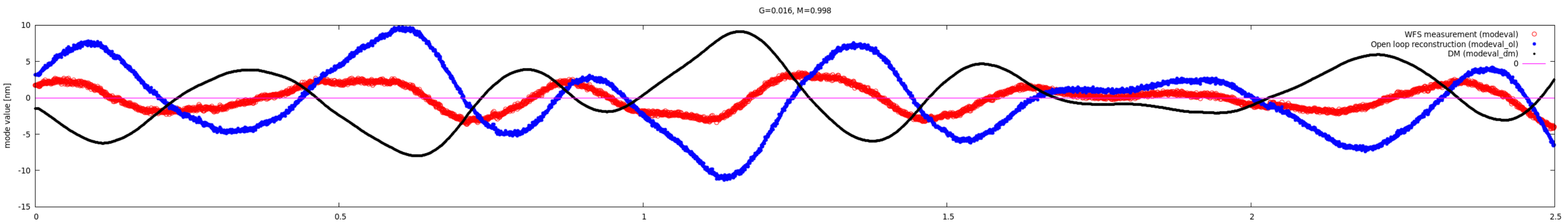
PyWFS running at 2kHz, 125mas modulation radius. Total delay = 2.6 frame

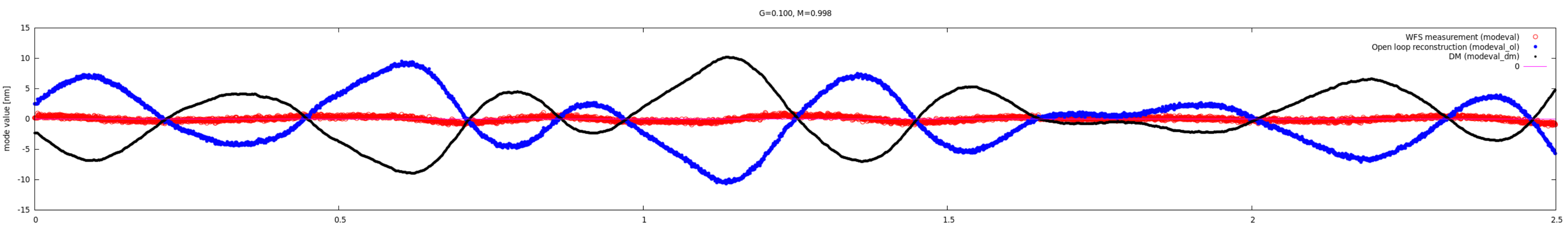


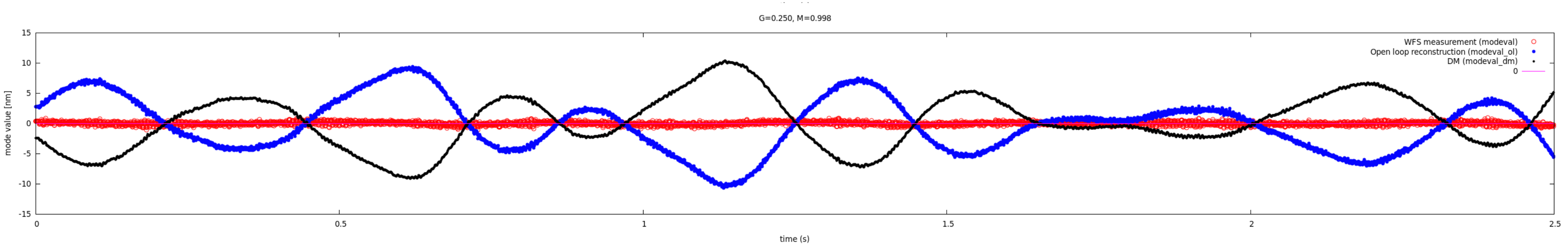
Open loop reconstruction: Changing gain (M=0.998)





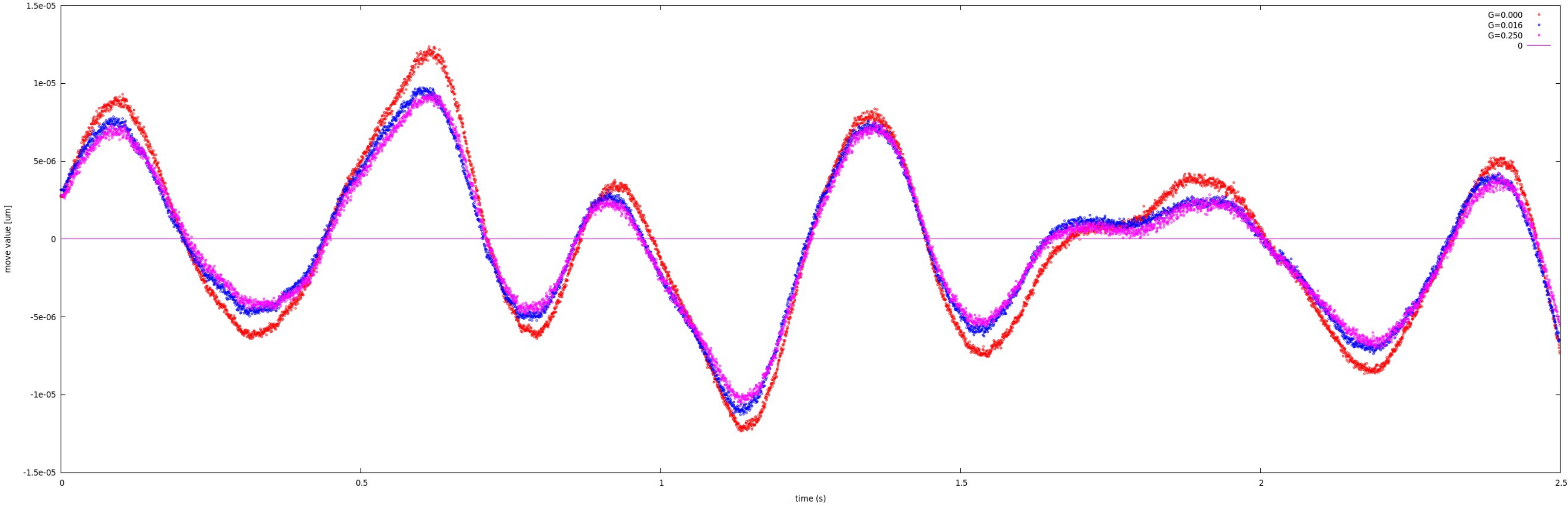






Open loop reconstruction
Comparison between gain values

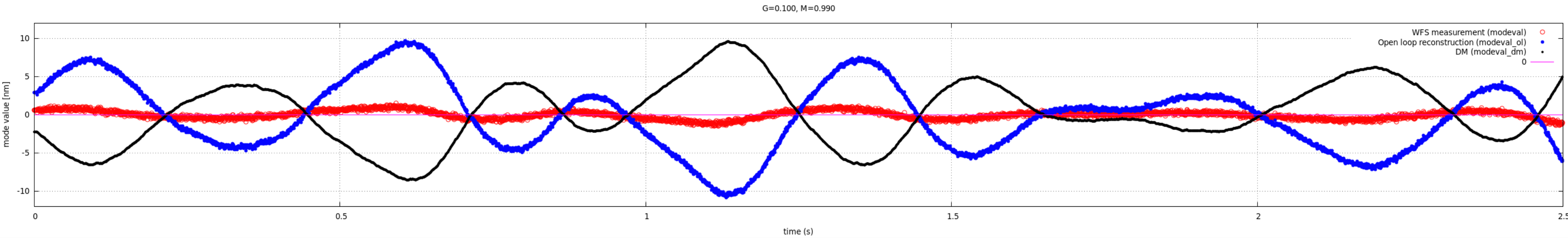
G=0.000 → over-estimates OL values
All G>0.0 reconstructions match at %-level

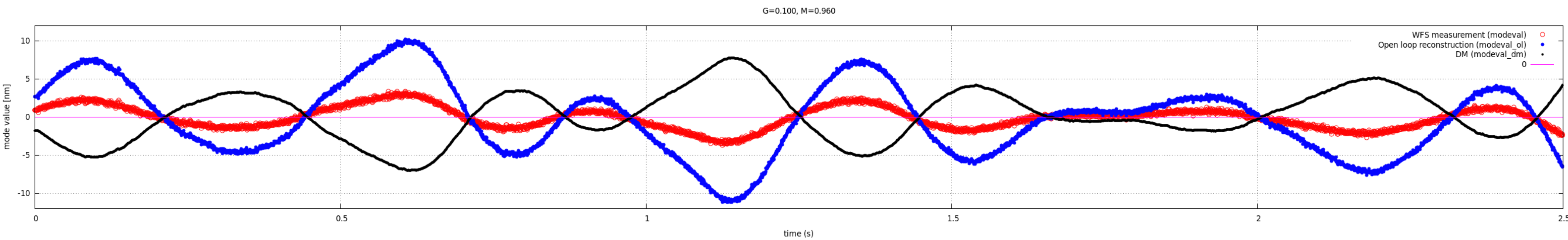


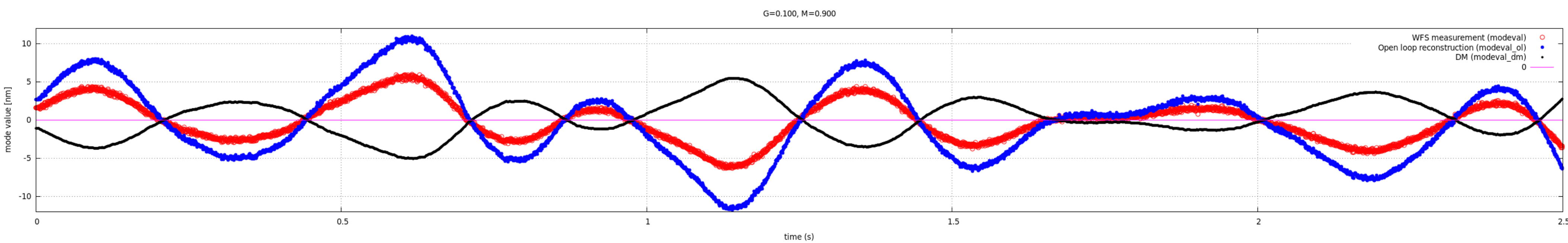
G=0.000 test relies entirely on WF residuals for OL estimation
G>0.000 tests rely mostly on DM values for OL estimation

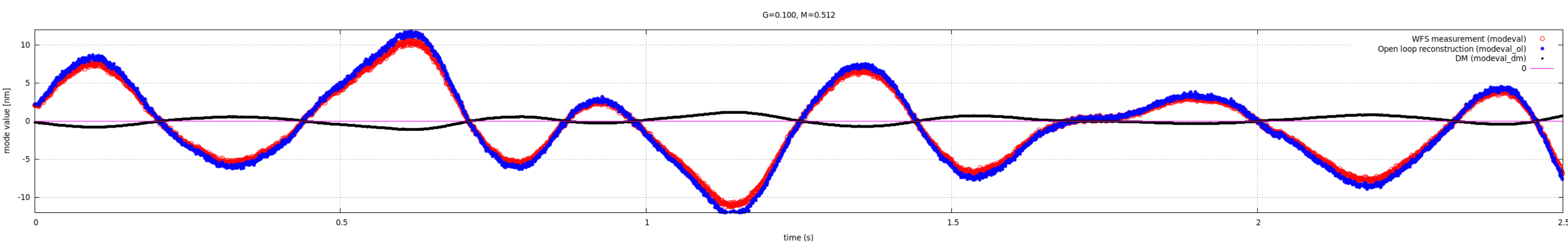
Test shown here uses full speed RM acquisition which underestimates RM by ~15% due to DM time-of-motion → reconstructed WFs from WFS are over-estimated by ~15%

Open loop reconstruction: Changing mult factor (G=0.100)



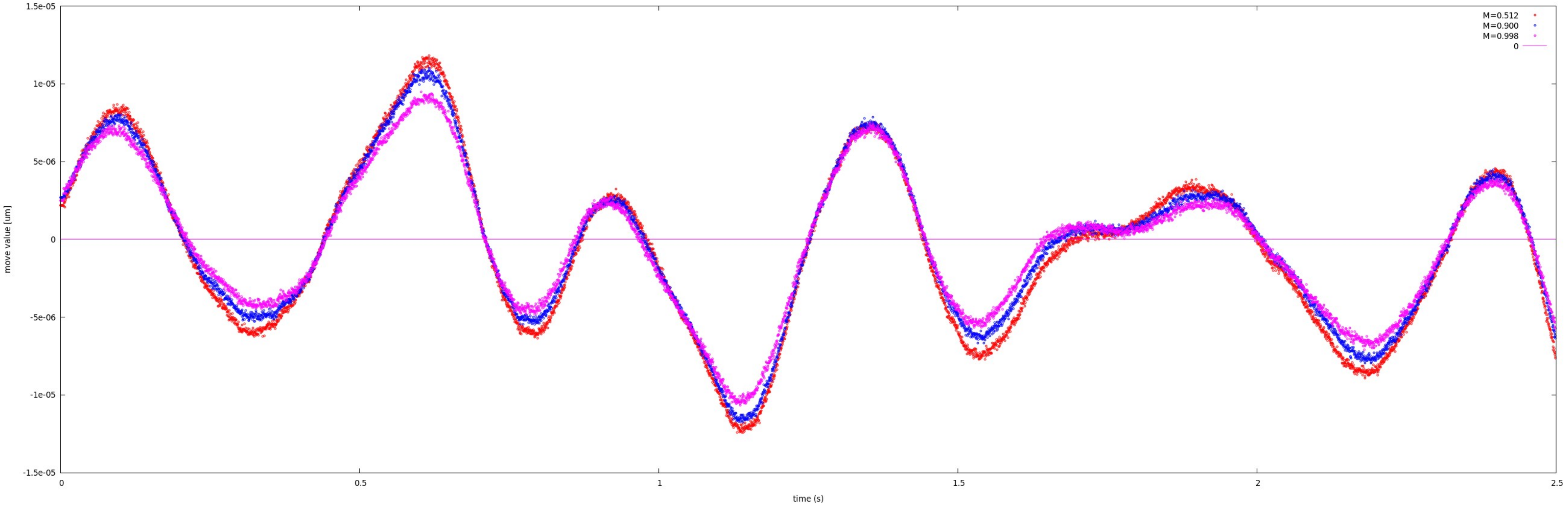






Open loop reconstruction
Comparison between Mult factor

Small M over-estimates OL values
→ same effect as G=0.0 over-estimation



M<<1 tests rely mostly on WF residuals for OL estimation
M~1 tests rely mostly on DM values for OL estimation

Test shown here uses full speed RM acquisition which underestimates RM by ~15% due to DM time-of-motion → reconstructed WFs from WFS are over-estimated by ~15%

Open loop reconstruction: noise propagation

NOISE = σ x sqrt(1 + M² G² / (1-M²))