04/21/11, T. Sekiguchi, E. Majorana

Comparison: TF Plots of Type-A VIS

Model

Type-A vibration isolation system for iLCGT

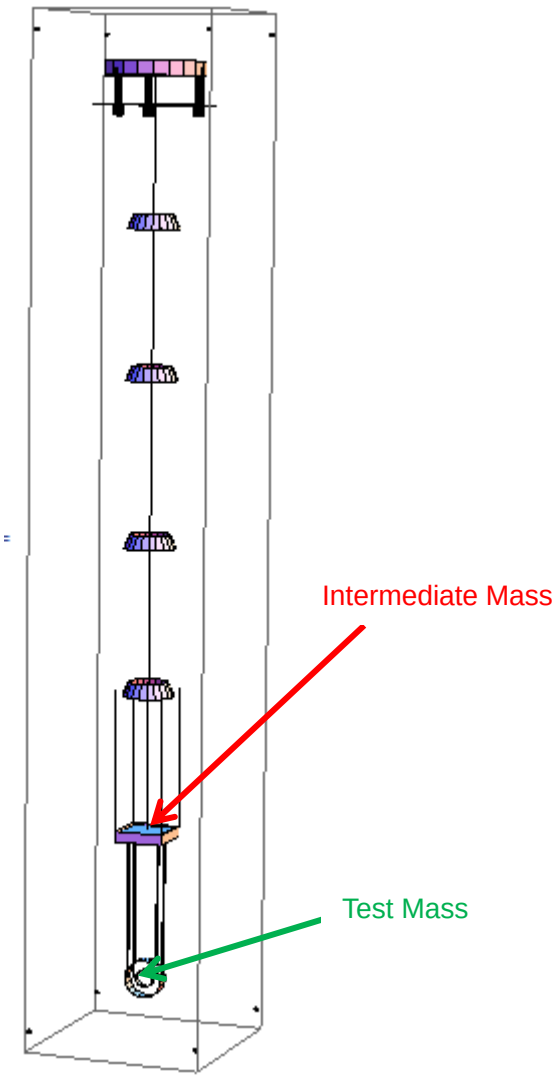
Parameters

```
Common Parameters
m1=106.24;m2=89.37;m3=86.51;mpf=83.65;
gap=0.01;gapPF=0.001;gapMB=0.001;gapIM=0.005;
gapRM=0.001;gapTM=0.001;

TM10
% F1 F2 F3 PF MB IM RM TM
m=[ m1 m2 m3 mpf 36 80 90.3 10.7];
Ix=[ 4 4 4 8 1.6 1.2 0.93 0.051];
Iy=[6.44 6.44 6.44 12 3.2 2.4 0.93 0.051];
Iz=[ 4 4 4 8 1.6 1.2 1.86 0.084];
frv=[0.33 0.33 0.33 0.33 0 0.33 0 0 ];
mat={'MA' 'MA' 'MA' 'MA' 'C70' 'MA' 'C70' 'W' };
l=[ 2.1 2.1 2.35 2.085 2.084 2.084 2.084 2.084 ];
d=[ 3.2 3.0 2.8 2.5 0.5 2.1 0.7 0.15 ]*1E-3;
sux=[ 0 0 0 0 0.35 0 0.27 0.125];
suz=[ 0 0 0 0 0.35 0 0.03 0.015];
suy=[ 0 0 0 0 0 0 0 0 ];
sdy=[-gap -gap -gap -gapPF -gapMB gapIM -gapRM -gapTM ];

TM30
% F1 F2 F3 PF MB IM RM TM
m=[ m1 m2 m3 mpf 36+5 80+5 90-30 20+10.7];
Ix=[ 4 4 4 8 1.6*1.4 1.2*1.06 0.75 0.275];
Iy=[6.44 6.44 6.44 12 3.2*1.4 2.4*1.06 0.75 0.275];
Iz=[ 4 4 4 8 1.6*1.4 1.2*1.06 1.5 0.14];
frv=[0.33 0.33 0.33 0.33 0 0.33 0 0 ];
mat={'MA' 'MA' 'MA' 'MA' 'C70' 'MA' 'C70' 'W' };
l=[ 2.1 2.1 2.35 2.085 2.084 2.084 2.084 2.084 ];
d=[ 3.2 3.0 2.8 2.5 0.5 2.1 0.5 0.2 ]*1E-3;
sux=[ 0 0 0 0 0.35 0 0.27 0.35/2];
suz=[ 0 0 0 0 0.35 0 0.03 0.03 ];
suy=[ 0 0 0 0 0 0 0 0 ];
sdy=[-gap -gap -gap -gapPF -gapMB gapIM -gapRM -gapTM ];
```

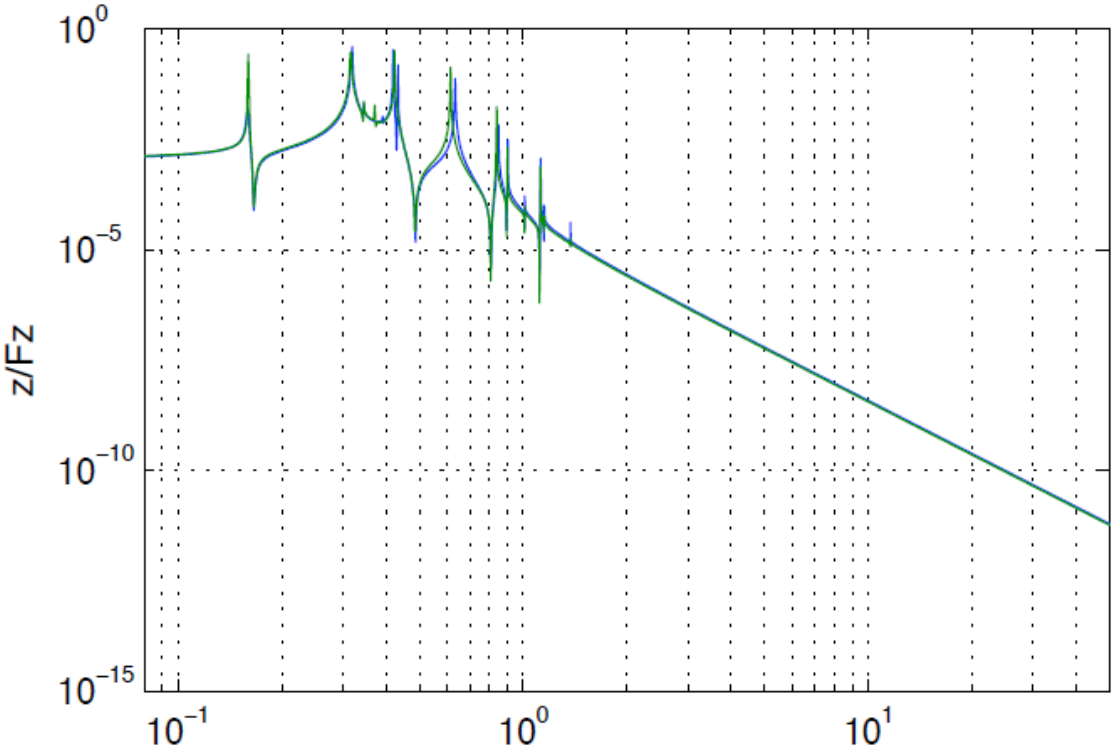
Plots

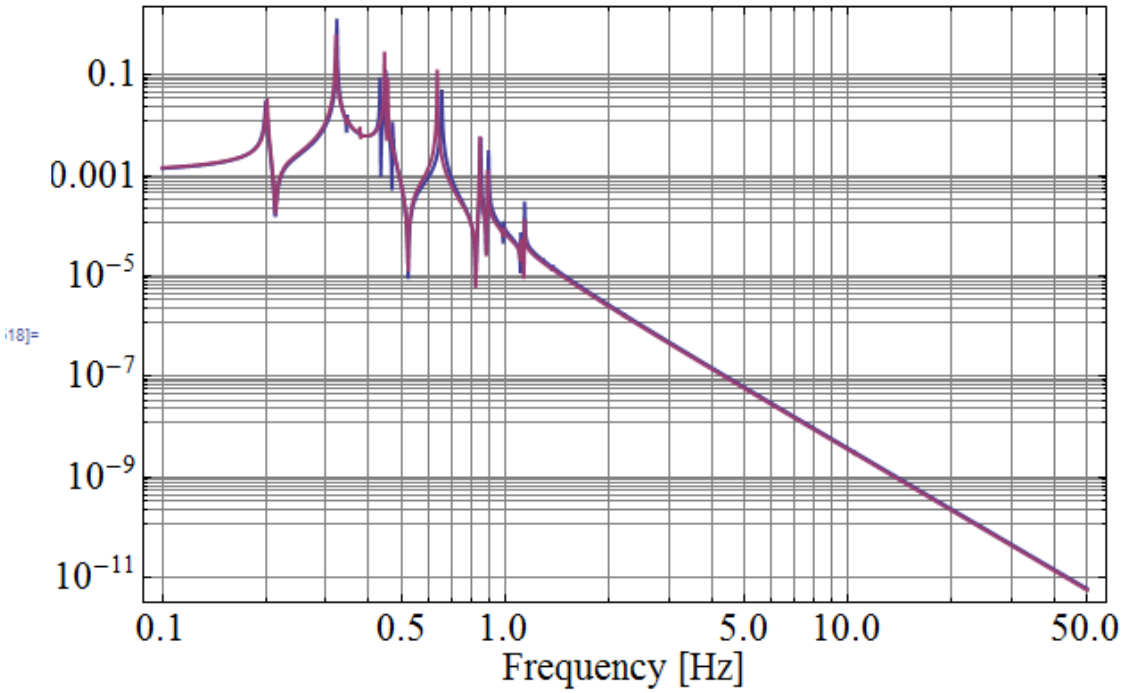
Transfer Functions from IM force/torque to TM displacement

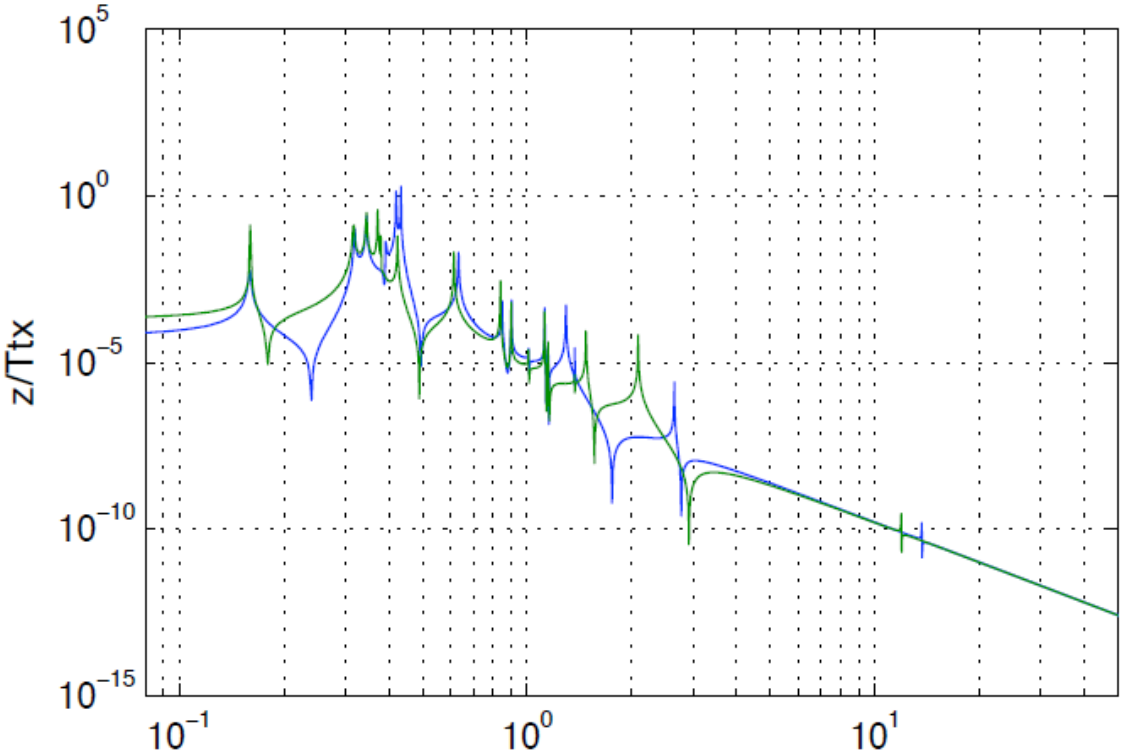
* Upper Plots: Results from E. Majorana (MATLAB)
  Green: TM30, Blue: TM10
* Lower Plots: Results from T. Sekiguchi (Mathematica)
  Purple: TM30, Blue: TM10

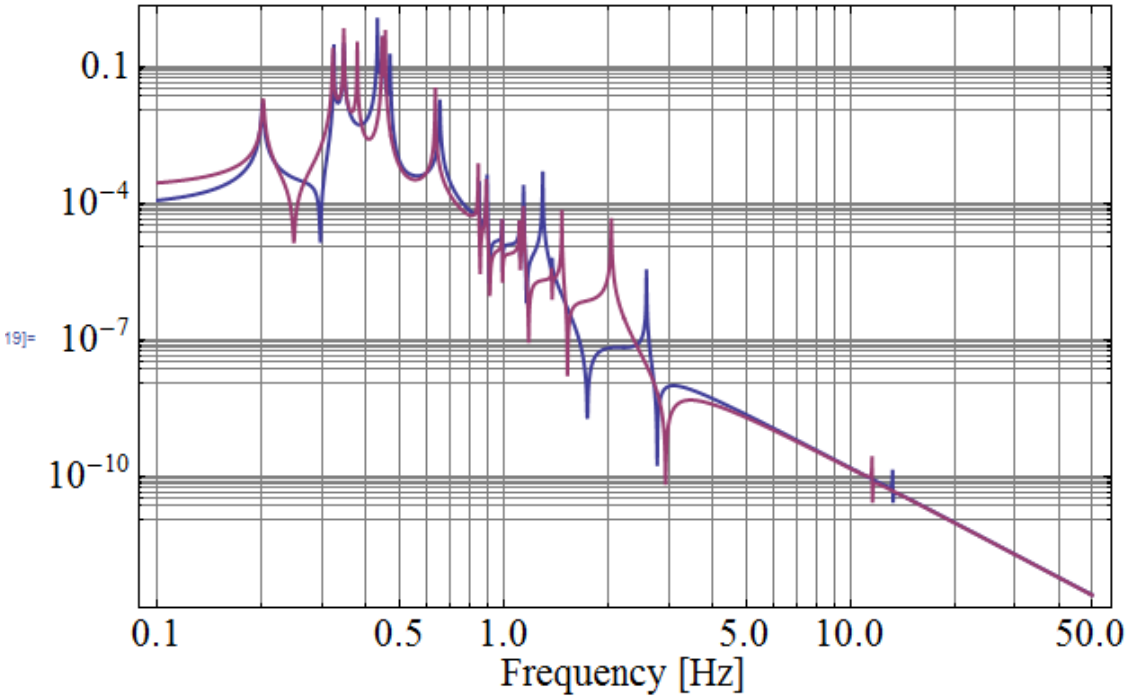


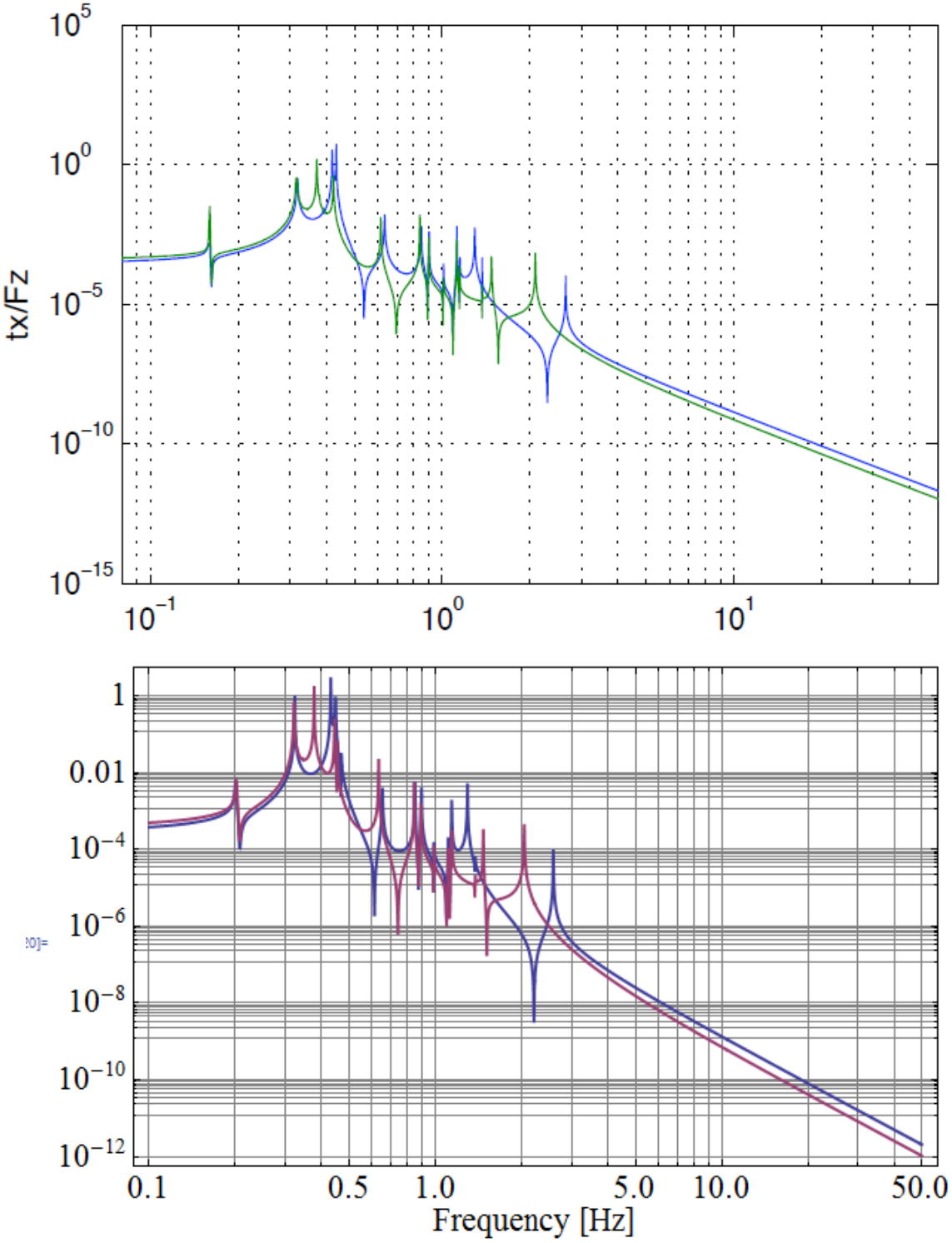
Comparison

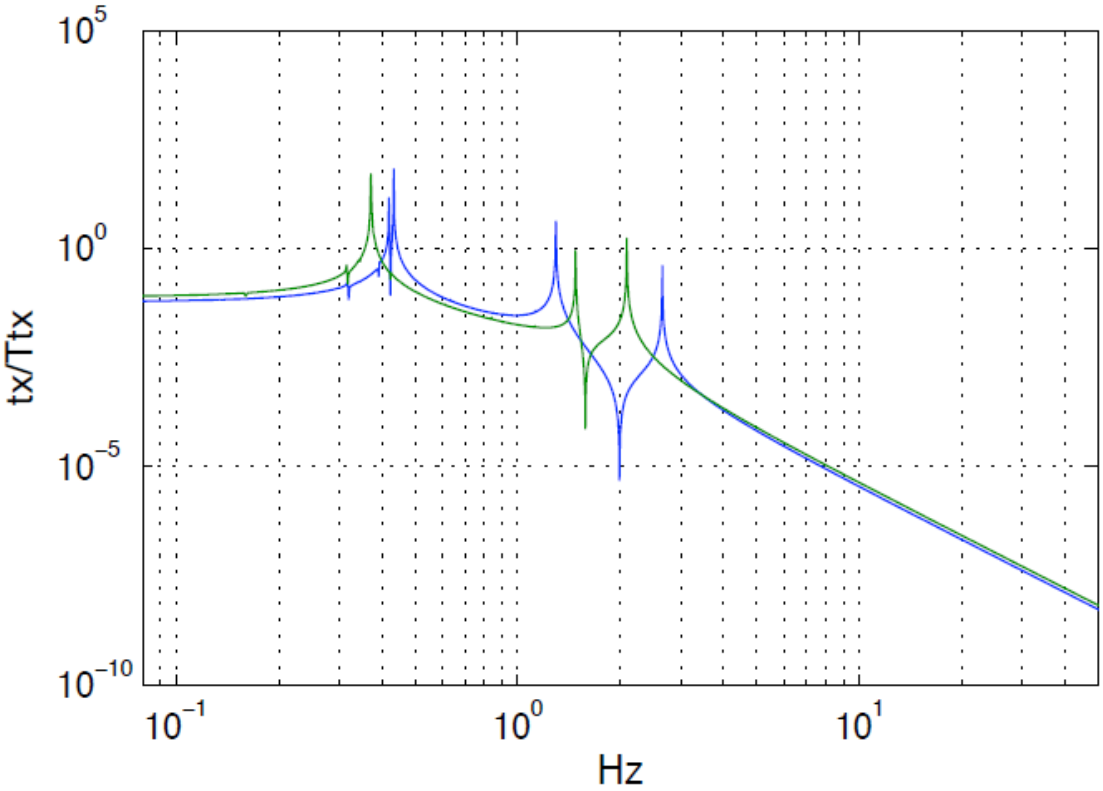

10^{0}
10^{-5}
10^{-10}
10^{-15}
z/Fz
10^{-1}
10^{0}
10^{1}

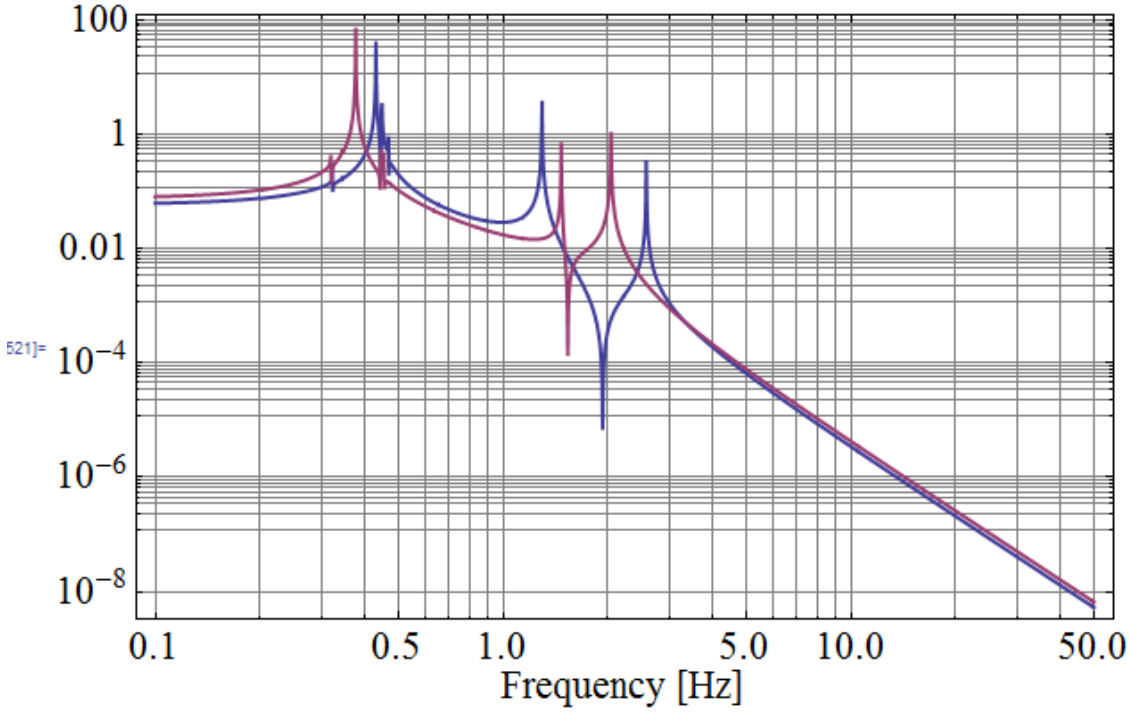

0.1
0.001
10^{-5}
10^{-7}
10^{-9}
10^{-11}
0.1
0.5
1.0
5.0
10.0
50.0
Frequency [Hz]

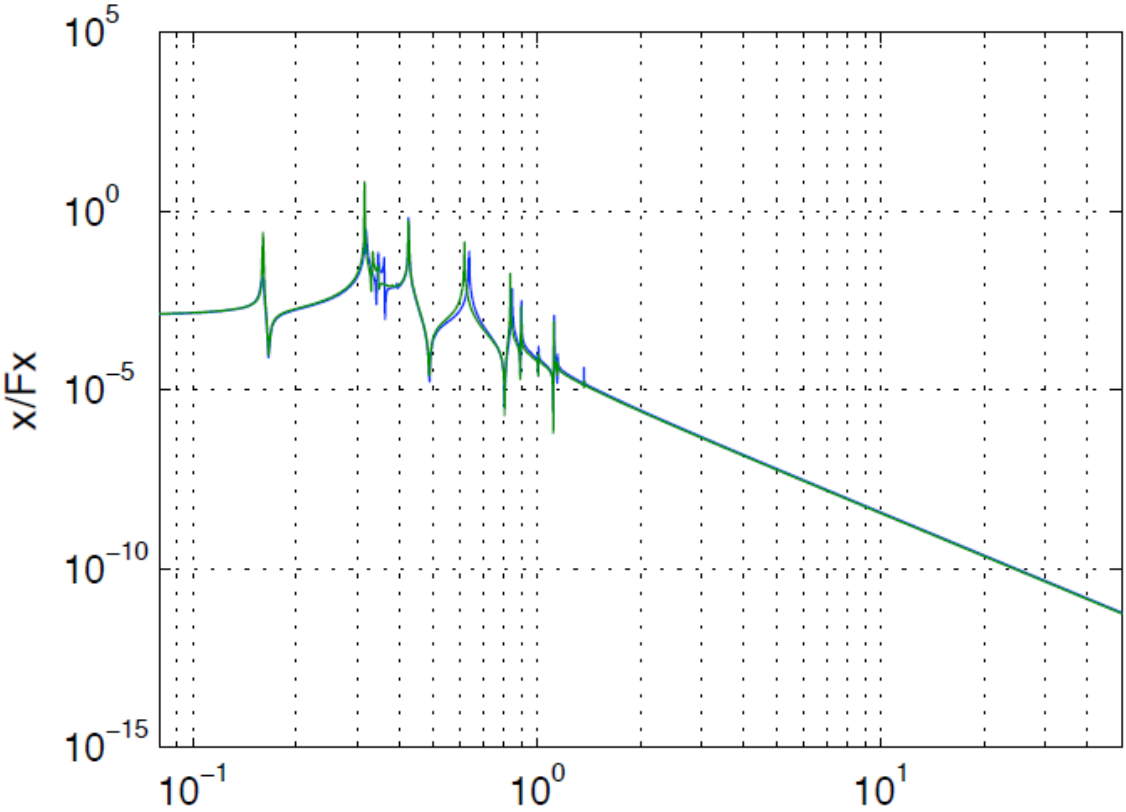

z/Ttx
10^{5}
10^{0}
10^{-5}
10^{-10}
10^{-15}
10^{-1}
10^{0}
10^{1}

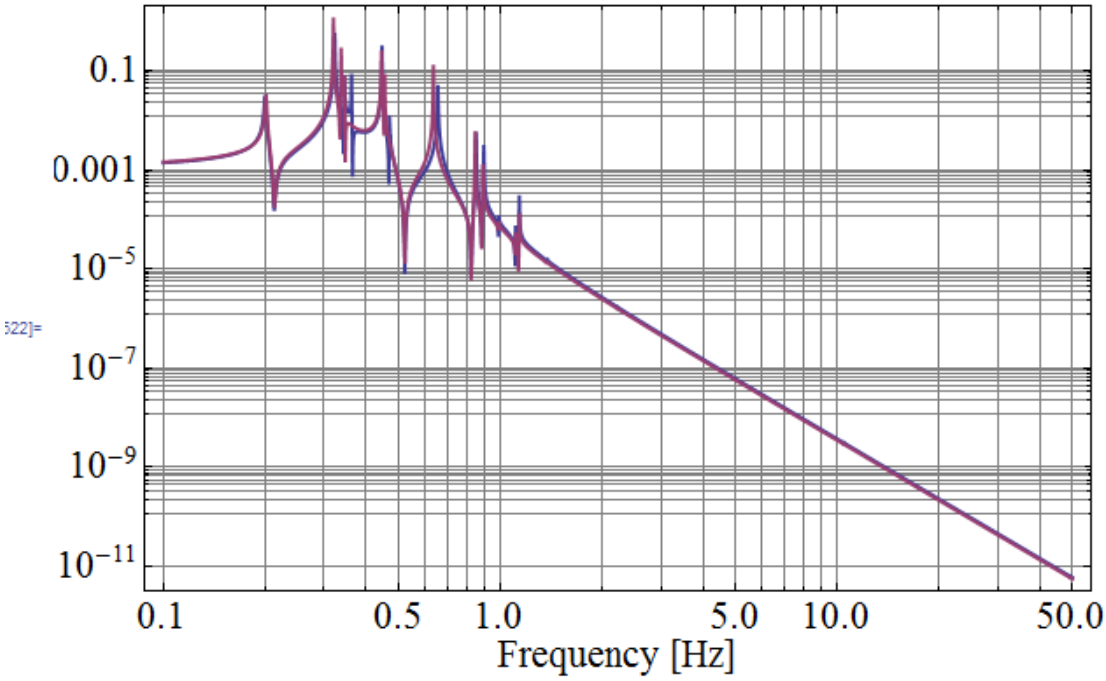

0.1
10^{-4}
10^{-7}
10^{-10}
0.1
0.5
1.0
5.0
10.0
50.0
Frequency [Hz]

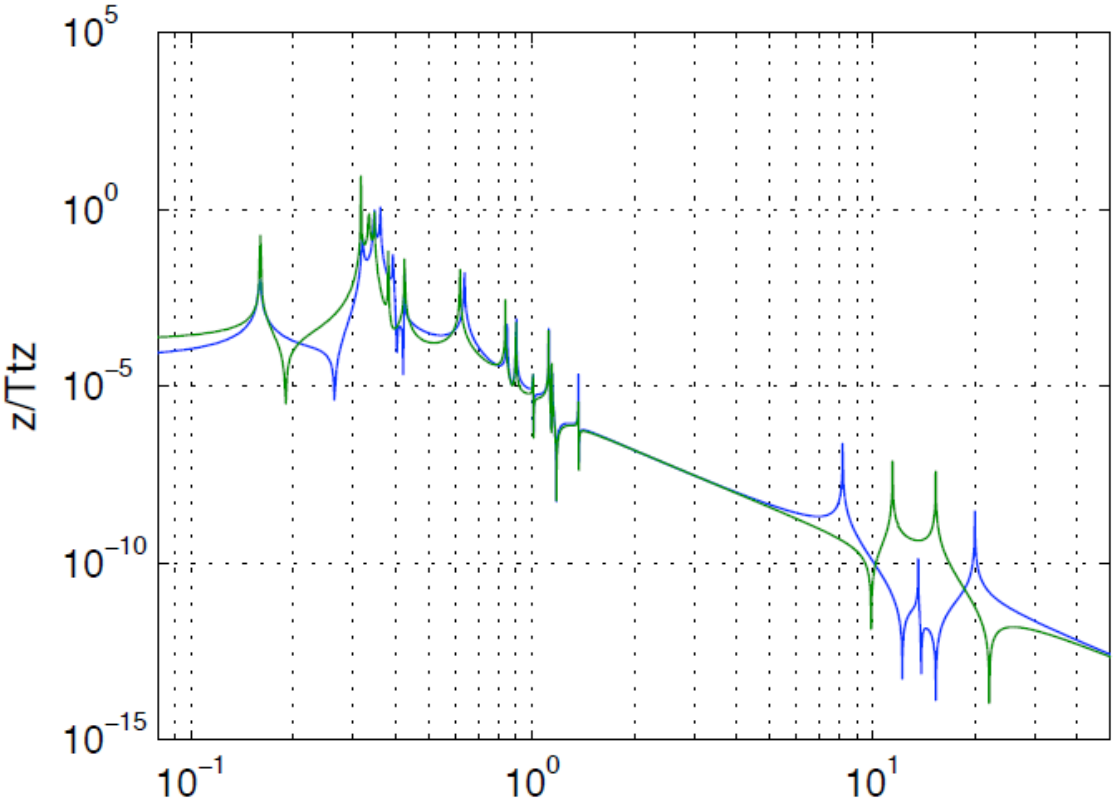

tx/Fz
10^{5}
10^{0}
10^{-5}
10^{-10}
10^{-15}
10^{-1}
10^{0}
10^{1}
1
0.01
10^{-4}
10^{-6}
10^{-8}
10^{-10}
10^{-12}
0.1
0.5
1.0
5.0
10.0
50.0
Frequency [Hz]

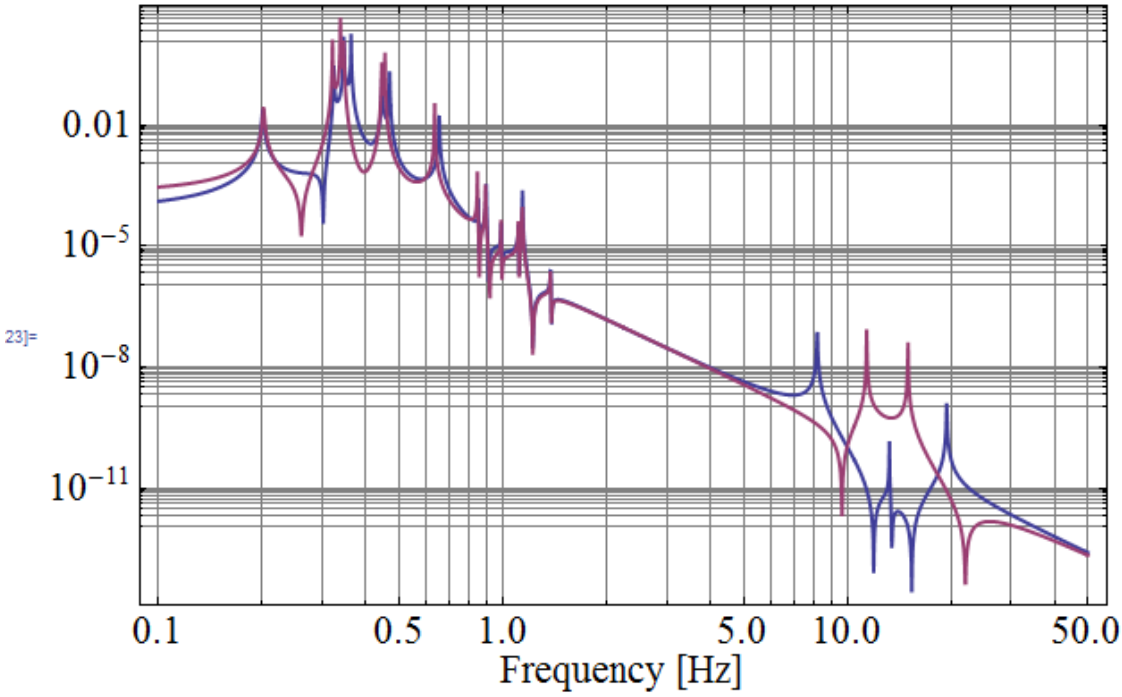

10^5
10^0
10^{-5}
10^{-10}
tx/Ttx
10^{-1}
10^0
10^1
Hz

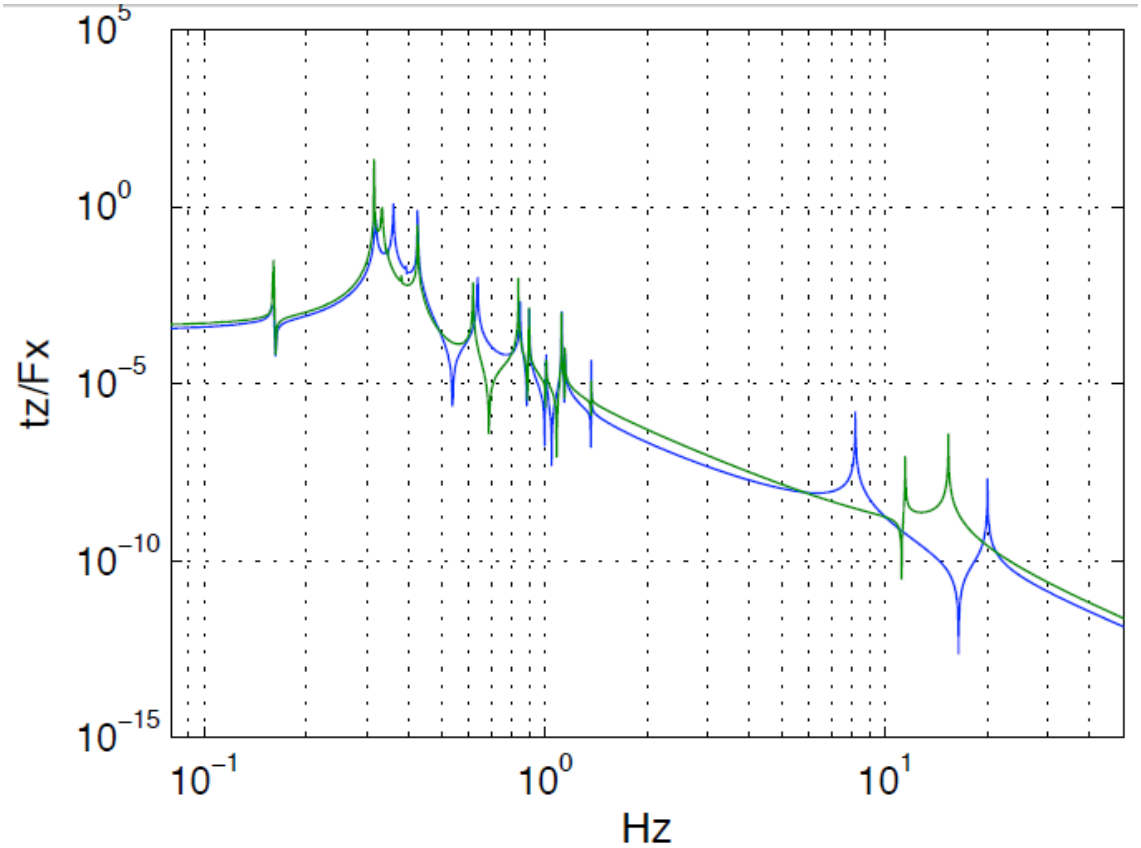

100
1
0.01
10^{-4}
10^{-6}
10^{-8}
0.1
0.5
1.0
5.0
10.0
50.0
Frequency [Hz]

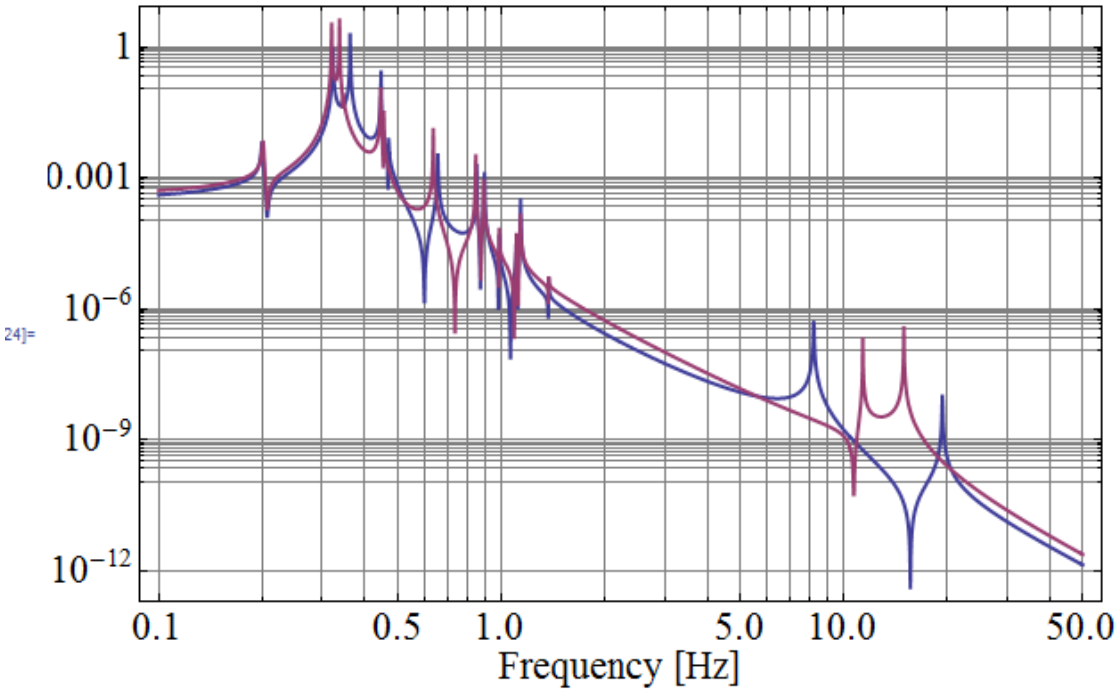

x/Fx
10^{5}
10^{0}
10^{-5}
10^{-10}
10^{-15}
10^{-1}
10^{0}
10^{1}

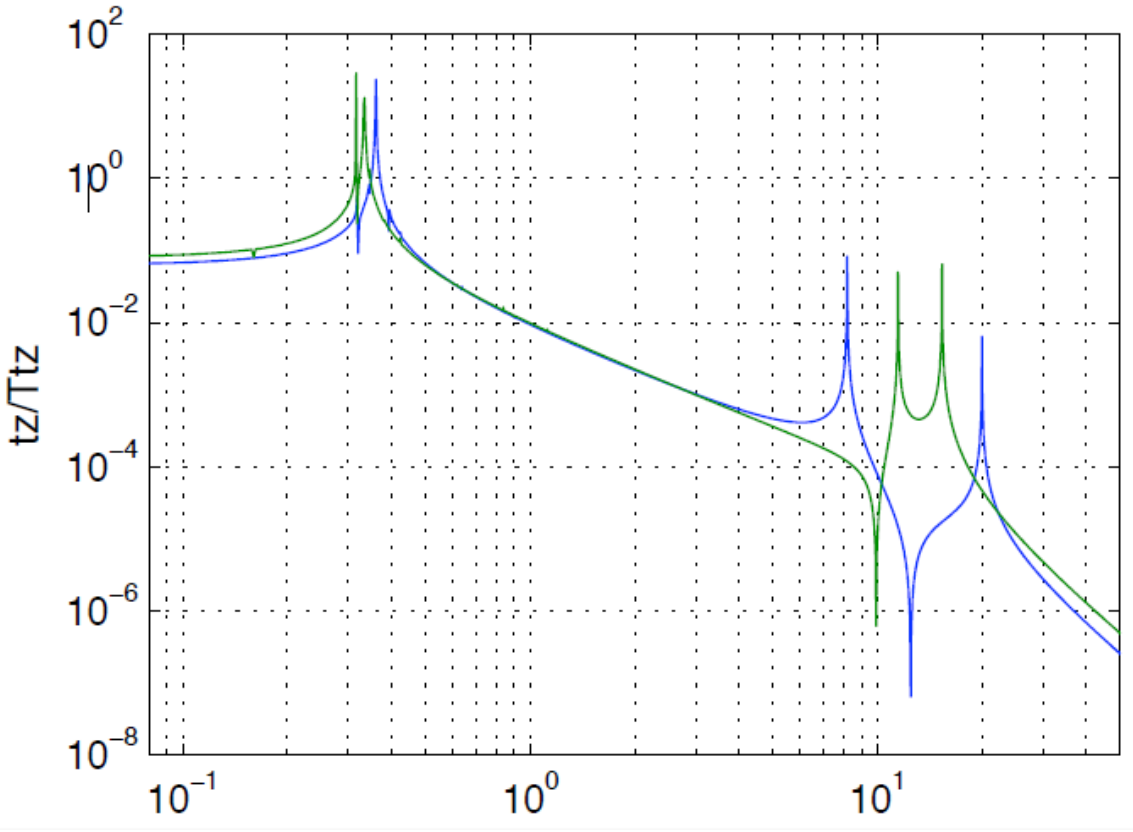

0.1
0.001
10^{-5}
10^{-7}
10^{-9}
10^{-11}
0.1
0.5
1.0
5.0
10.0
50.0
Frequency [Hz]

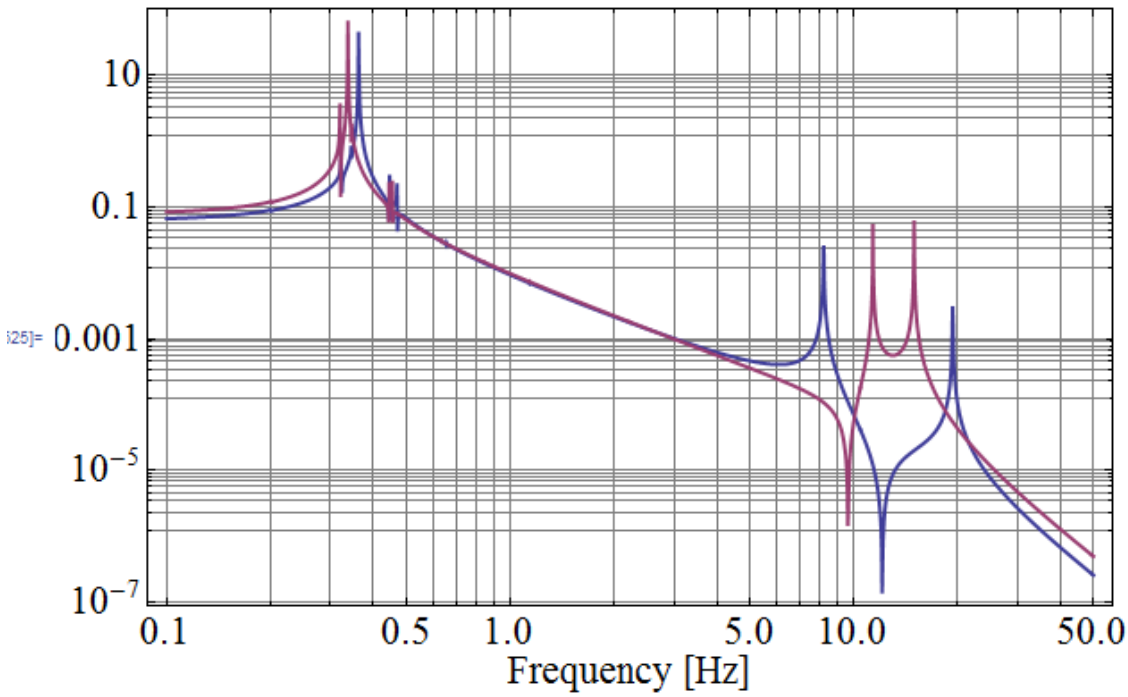

z/Ttz
10^{5}
10^{0}
10^{-5}
10^{-10}
10^{-15}
10^{-1}
10^{0}
10^{1}

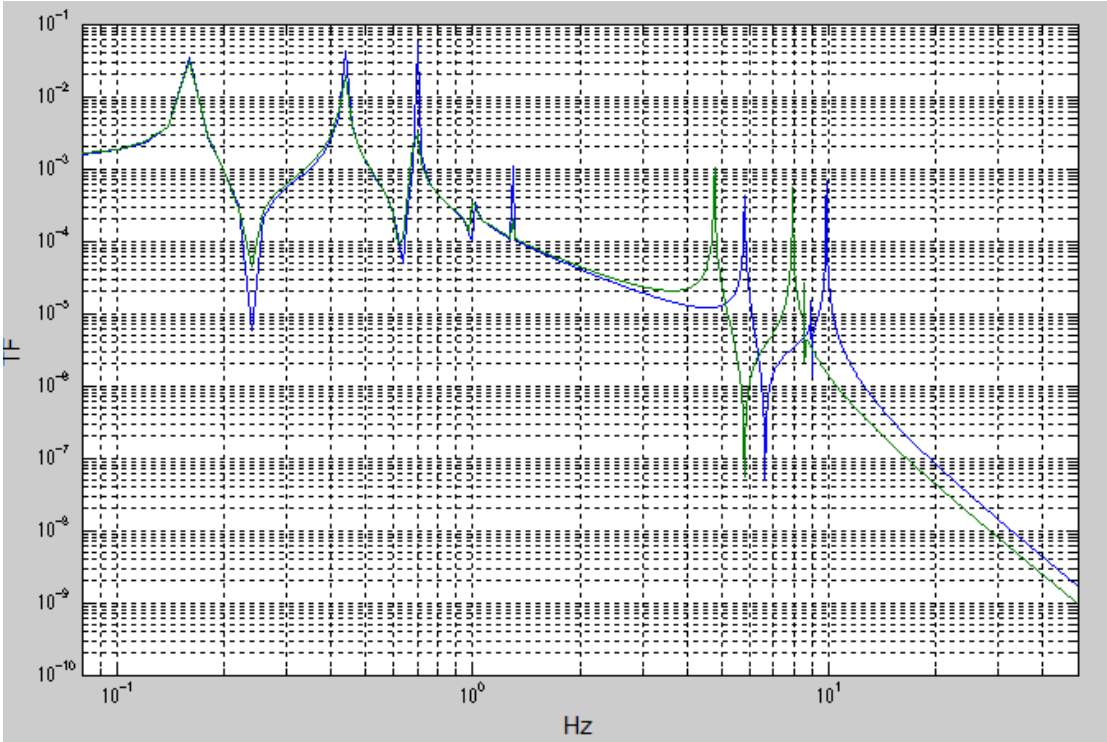

0.01
10^{-5}
10^{-8}
10^{-11}
0.1
0.5
1.0
5.0
10.0
50.0
Frequency [Hz]

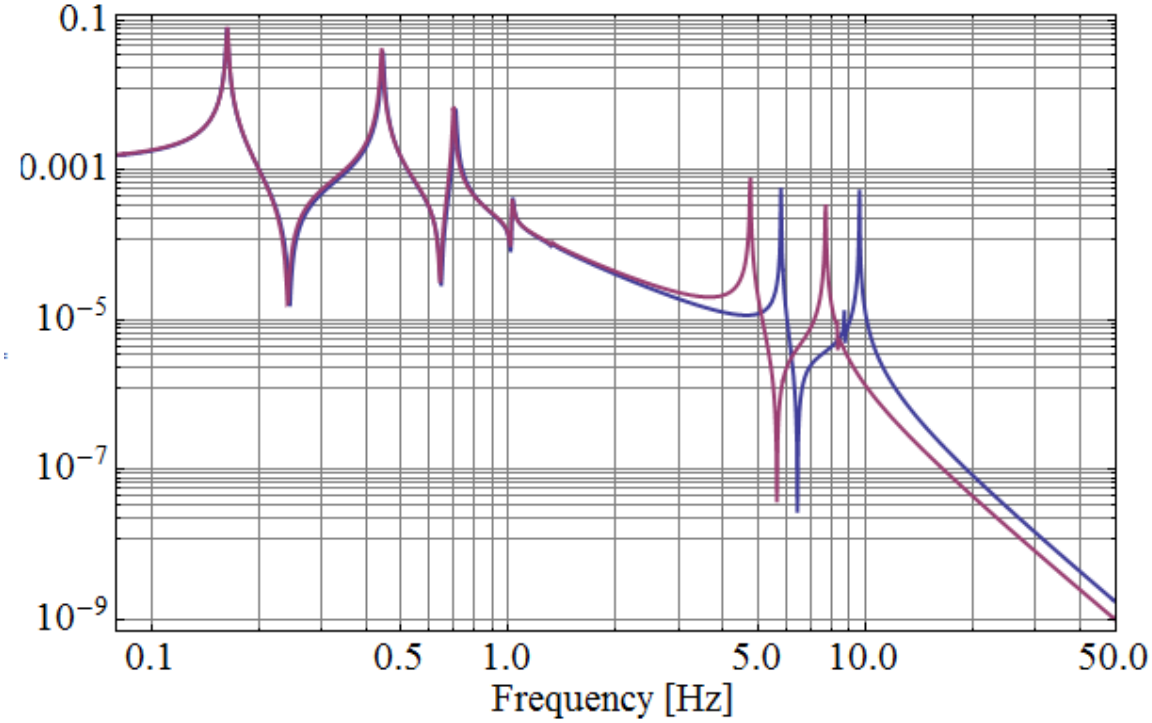

tz/Fx
Hz

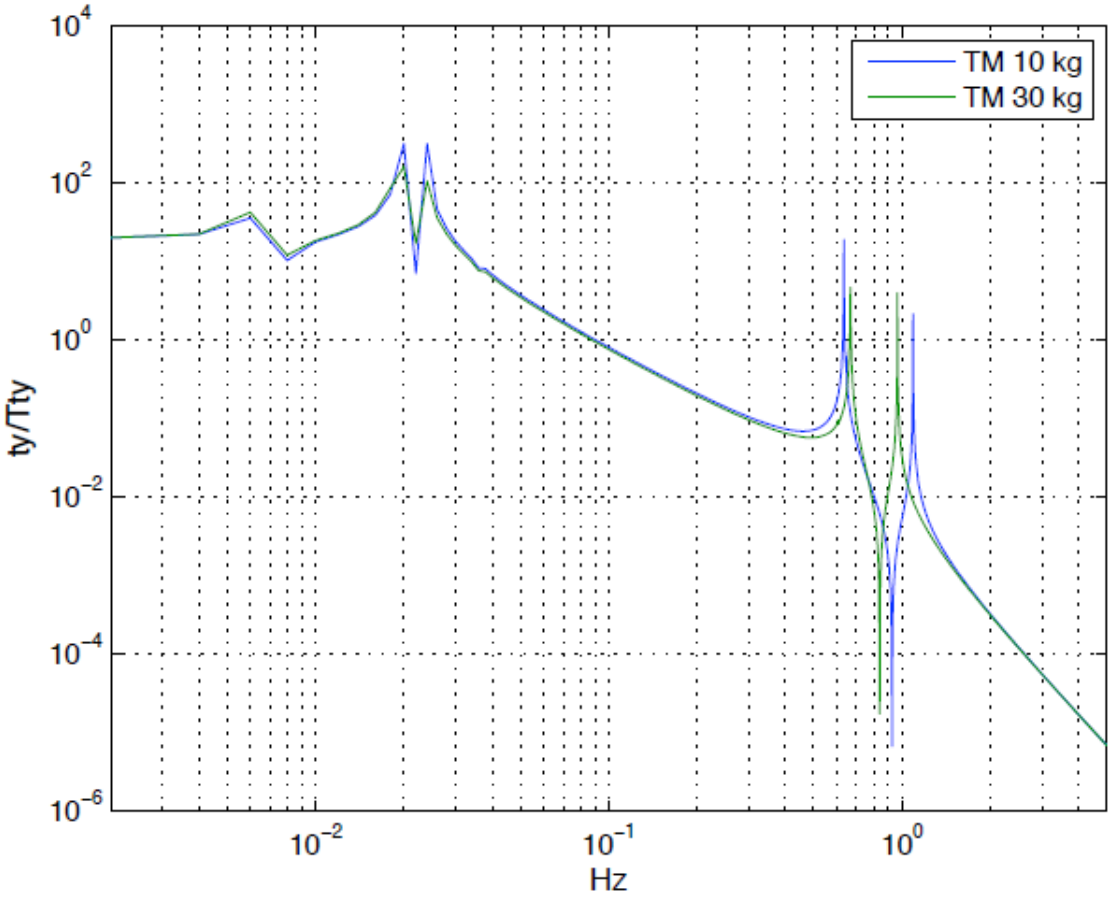

Frequency [Hz]

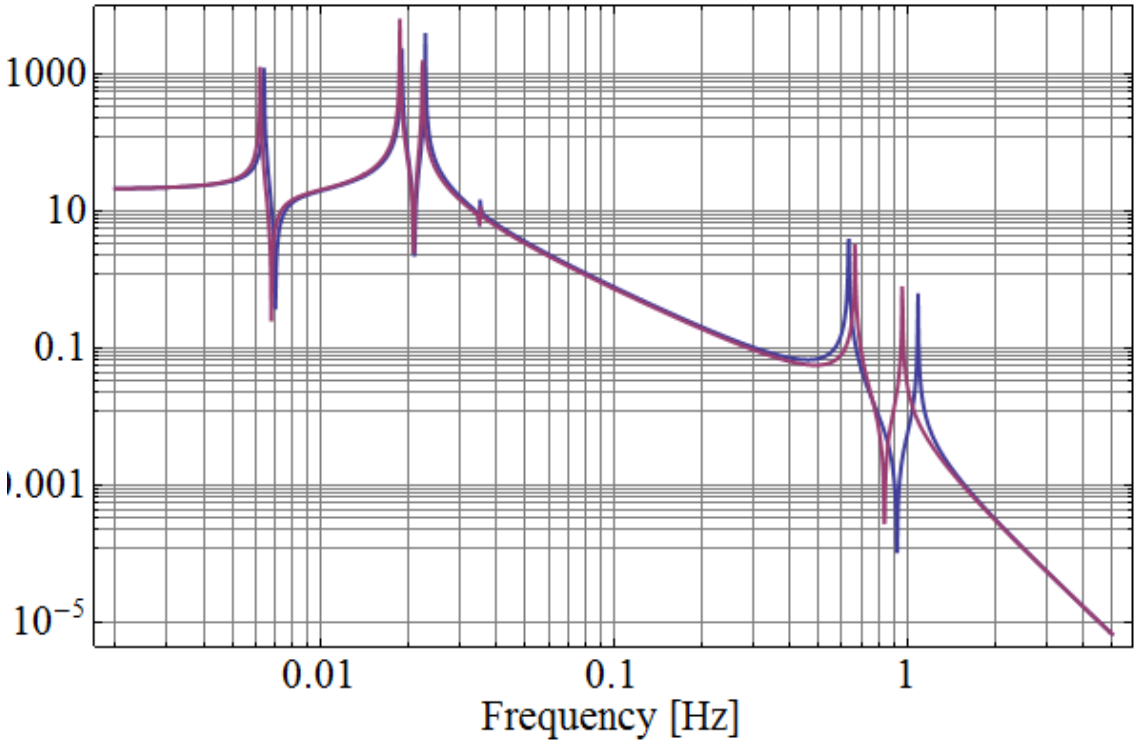

tz/Ttz
10^{2}
10^{0}
10^{-2}
10^{-4}
10^{-6}
10^{-8}
10^{-1}
10^{0}
10^{1}


10
0.1
0.001
10^{-5}
10^{-7}
0.1
0.5
1.0
5.0
10.0
50.0
Frequency [Hz]


TF
Hz


0.1
0.001
10^{-5}
10^{-7}
10^{-9}
0.1
0.5
1.0
5.0
10.0
50.0
Frequency [Hz]


TM 10 kg
TM 30 kg
ty/Tty
Hz


1000
10
0.1
.001
0.01
0.1
1
Frequency [Hz]

Good agreement.

* Small differences in the lowest pendulum mode frequencies
  → Maybe different parameters about the pre-isolator stage were used
  (We had not shared the parameters yet.)