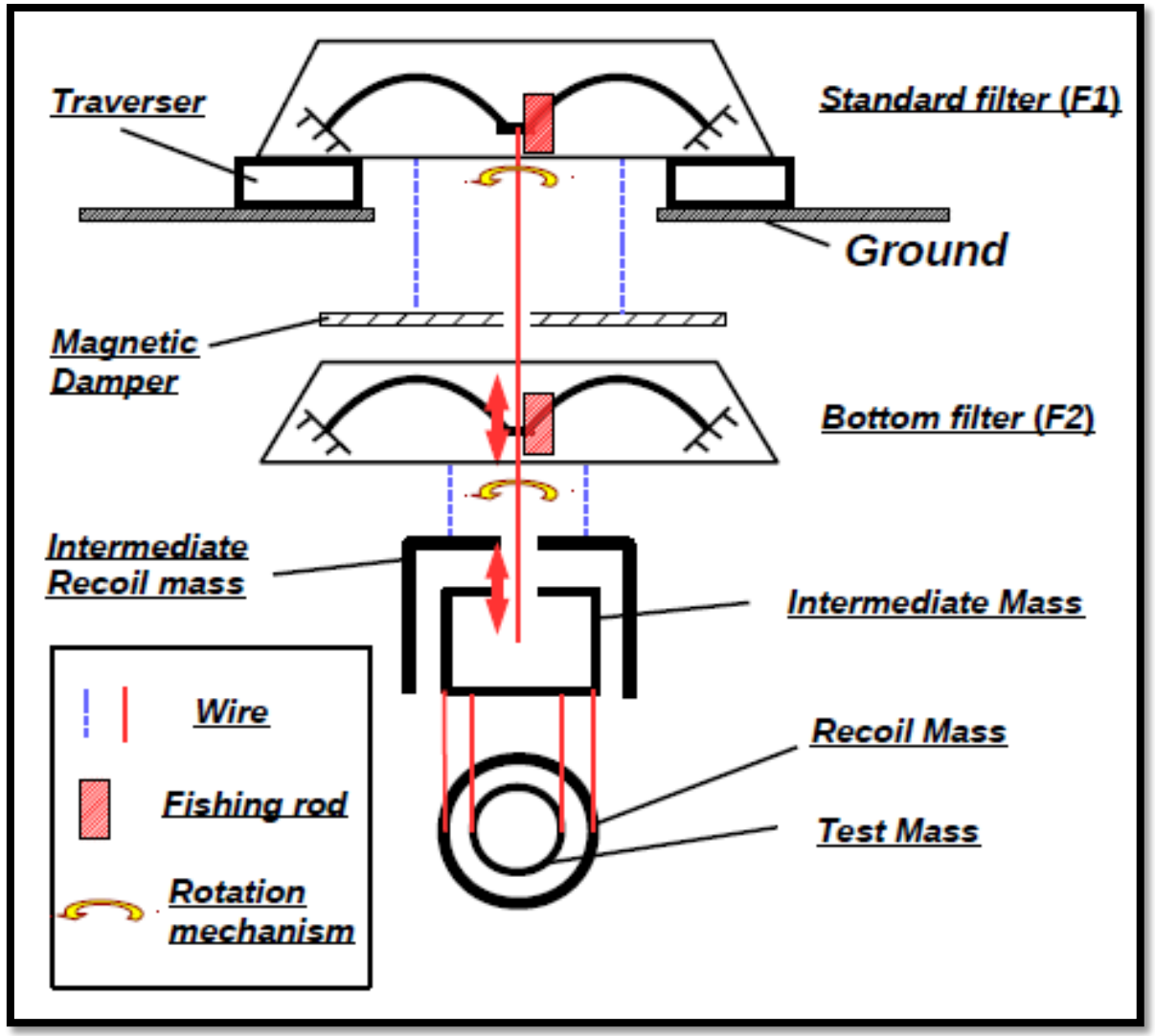
TypeBp with MD



Mechanical response

Calculated by SUMCON (and Simulink)

SUMCON in Mathematica

SUMCON Version:1.32

About SUMCON | Version Info | Reflesh

New Model | Load Model | Save Model | typeBp_wMD160110.m

TypeBp with MD 160110

Model Construction | Calculation Result | Export Model

Model Basic Information

Degrees of Freedom:

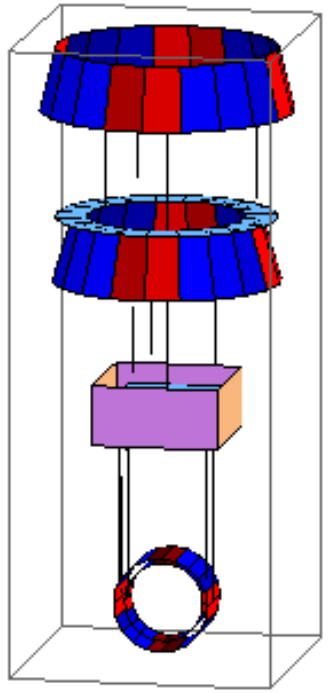
36 State Variables
6 Input Variables
2 Float Variables

Ground Position:

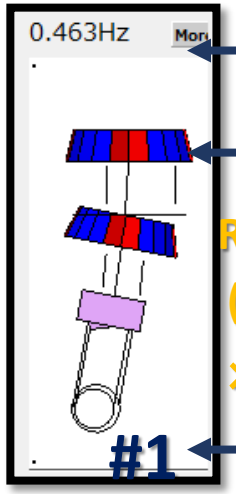
xF1 → 0. yF1 → 0. zF1 → 0. pitchF1 → 0. yawF1 → 0. rollF1 → 0.

Equilibrium Point:

xF2 → 0.	yF2 → −0.5435	zF2 → 0.	pitchF2 → 0.	yawF2 → 0.	rollF2 → 0.
xIR → 0.	yIR → −1.0461	zIR → 0.	pitchIR → 0.	yawIR → 0.	rollIR → 0.
xIM → 0.	yIM → −1.0762	zIM → 0.	pitchIM → 0.	yawIM → 0.	rollIM → 0.
xRM → 0.	yRM → −1.6632	zRM → 0.	pitchRM → 0.	yawRM → 0.	rollRM → 0.
xTM → 0.	yTM → −1.6632	zTM → 0.	pitchTM → 0.	yawTM → 0.	rollTM → 0.
xMD → 0.	yMD → −0.44	zMD → 0.	pitchMD → 0.	yawMD → 0.	rollMD → 0.
hGAS2 → 0.046	hGAS1 → 0.0099				



Eigen Mode List



Resonance frequency

Eigen mode shape

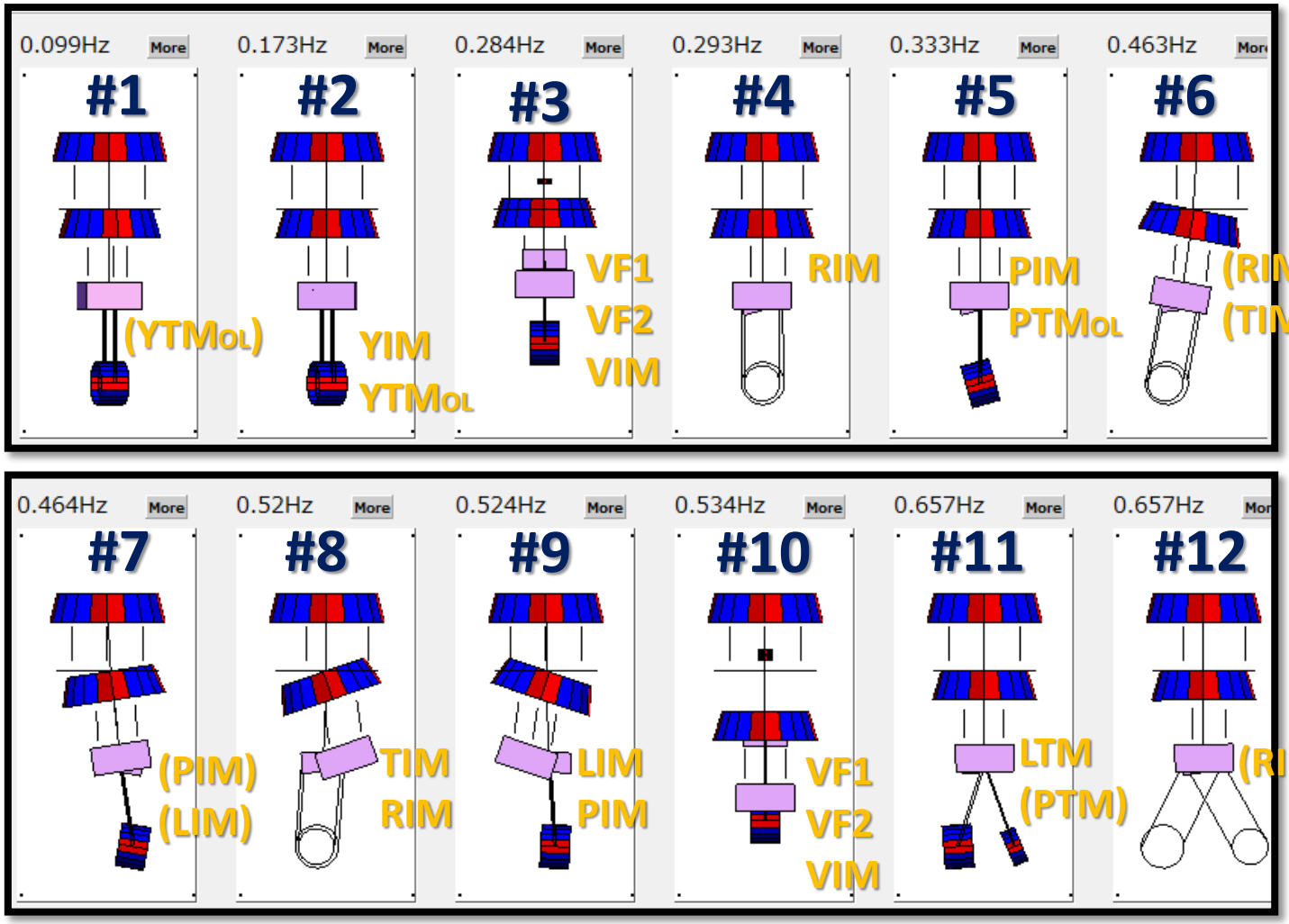
RIM Sensing / Excitation point

() Hardly seen/excited

× Cannot be seen/excited

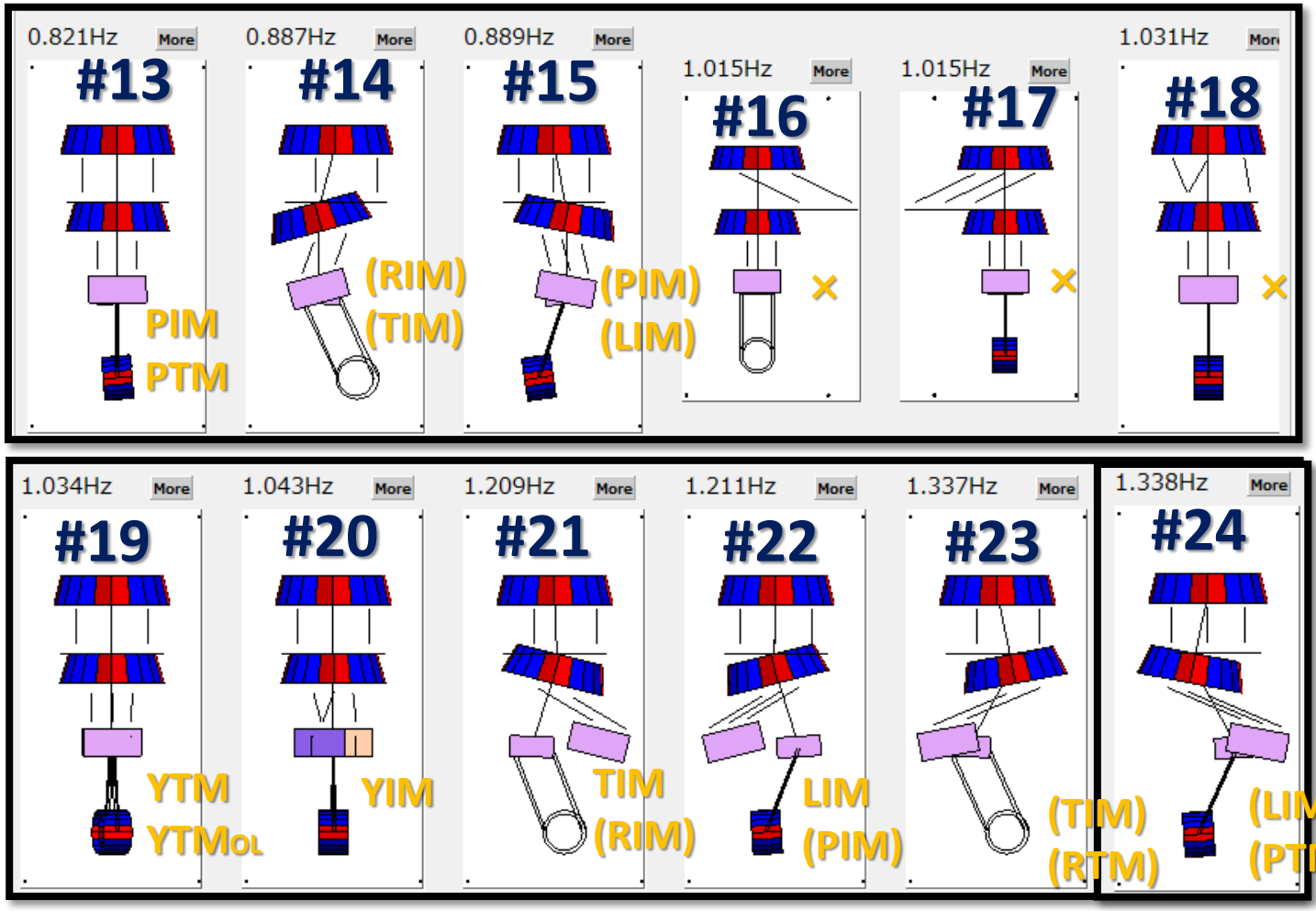
Eigen mode number

Eigen Mode Shape



#1 : YWholeChain
#2 : YPayload
#3 : VPaylaod
#4 : RPaylaod
#5 : PPayload
#6 : TPendulum
#7 : LPendulum
#8 : RF2
#9 : PF2
#10 : GAS
#11 : LTM
#12 : TTM

Eigen Mode Shape



#13 : PTM

#14 : Pendulum

#15 : Pendulum

#16 : TMD

#17 : LMD

#18 : YMD

#19 : YTM
(YTN, -YRM)

#20 : YIR

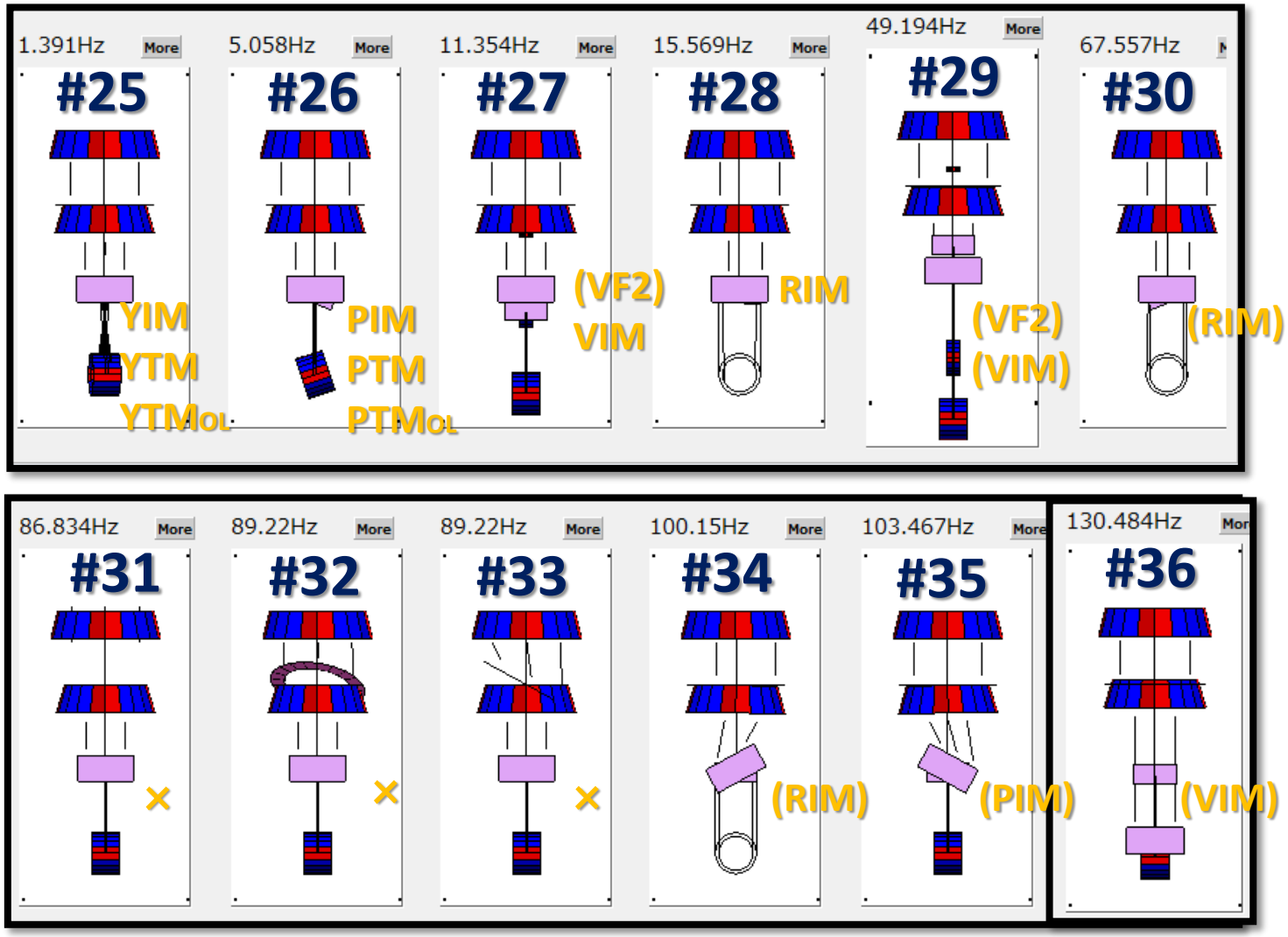
#21 : TIR

#22 : LIR

#23 : TPendulum

#24 : LPendulum

Eigen Mode Shape



#25 : YTM

#26 : PRM
(PIM, -PRM)

#27 : VTM

#28 : RTM

#29 : VRM

#30 : RIM
(RIM, -RRM)

#31 : VMD

#32 : RMD

#33 : PMD

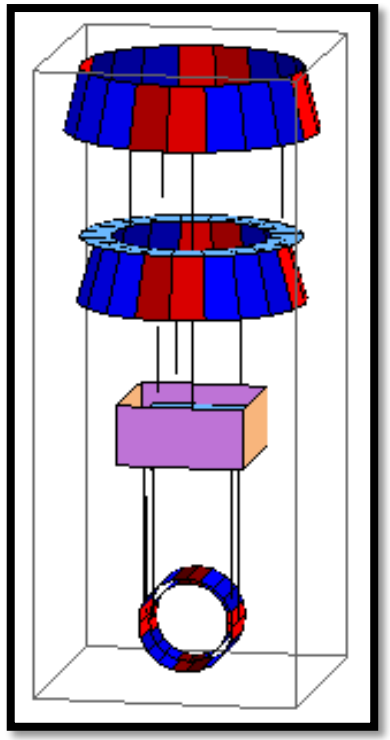
#34 : RIR

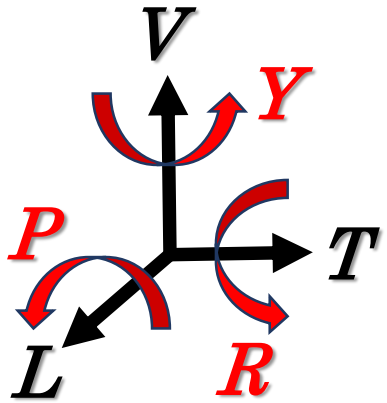
#35 : PIR

#36 : VIR

Force Transfer Functions

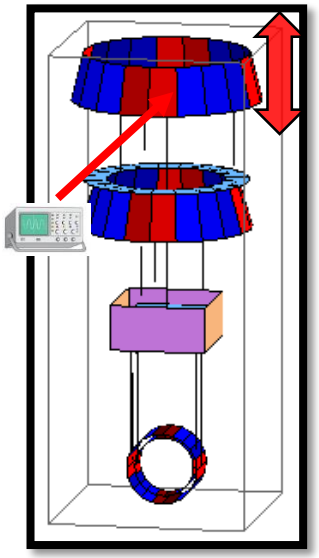
(, which can be measured, with No ctrl)

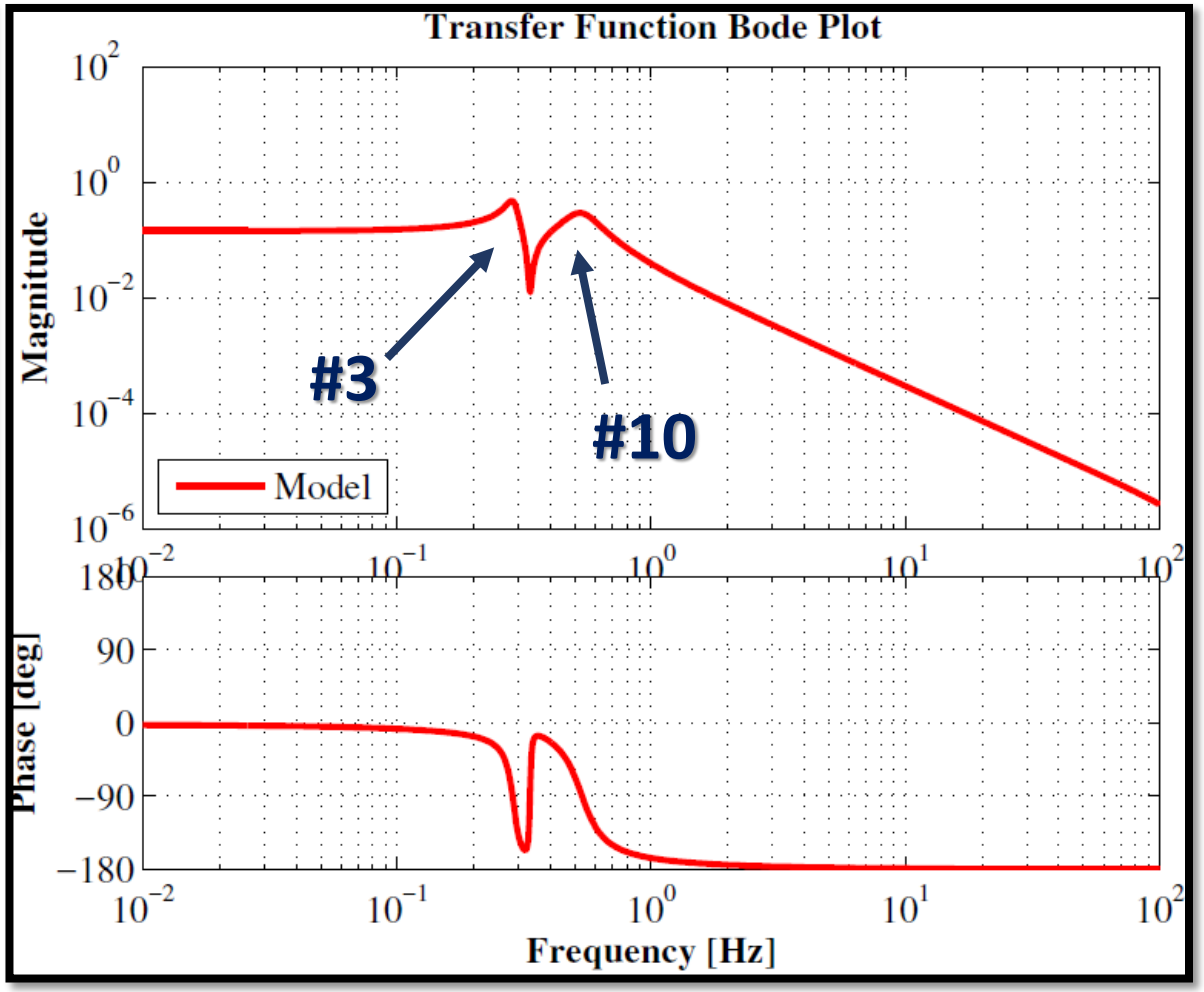




Force Transfer Function

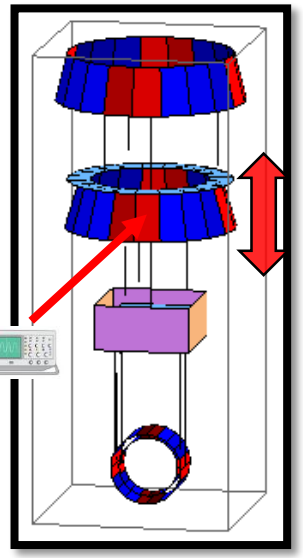
LVDT_VF1 / actVF1

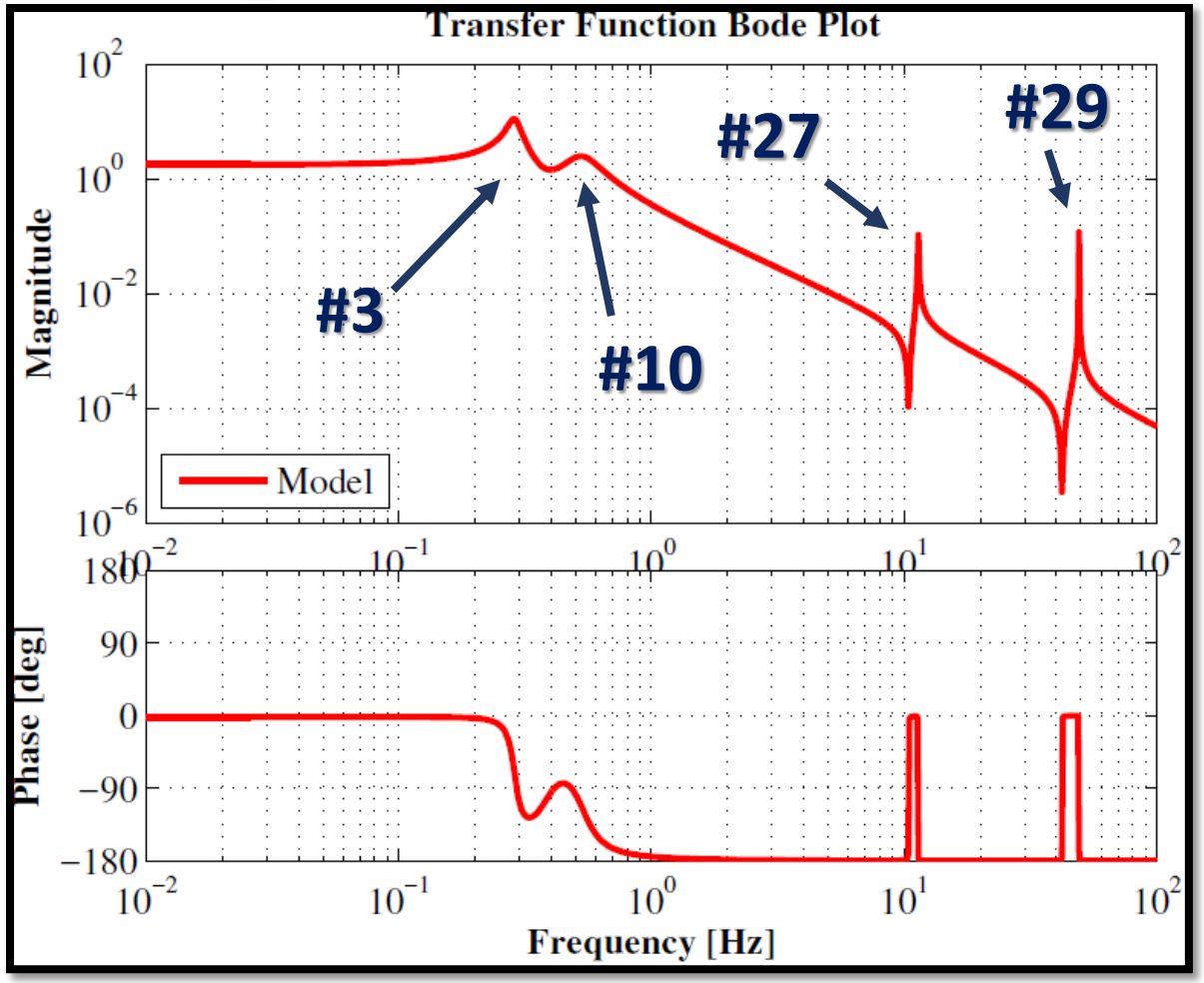




Force Transfer Function

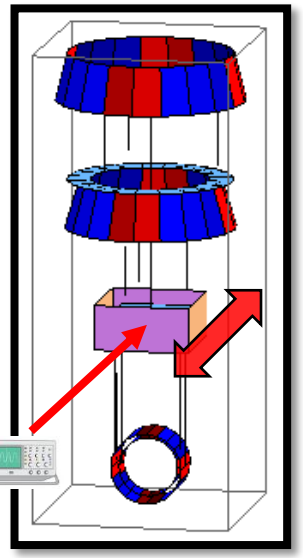
LVDT_VF2 / actVF2

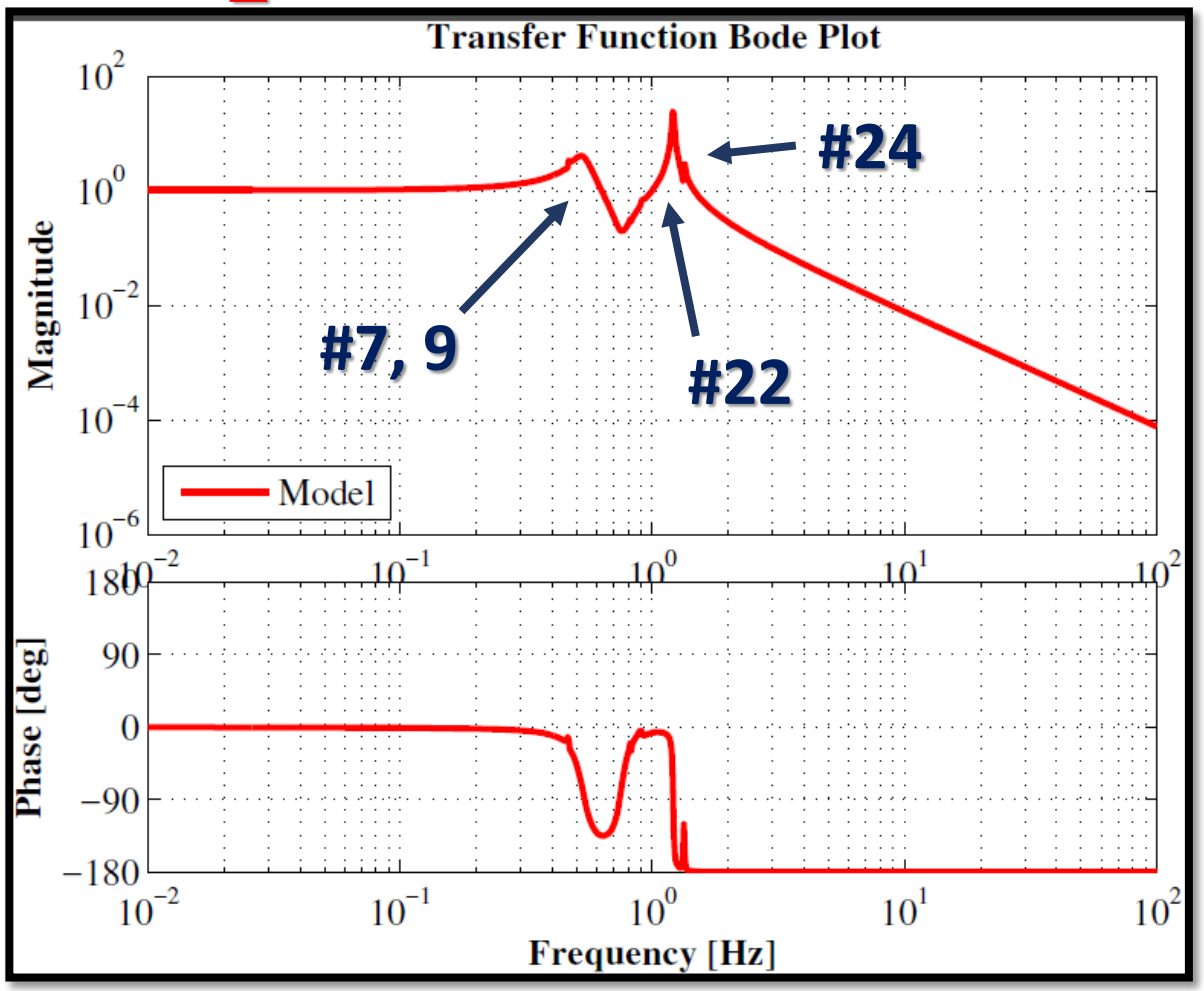




Force Transfer Function

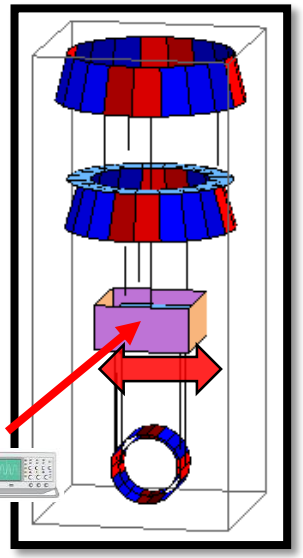
OSEM_LIM / actLIM

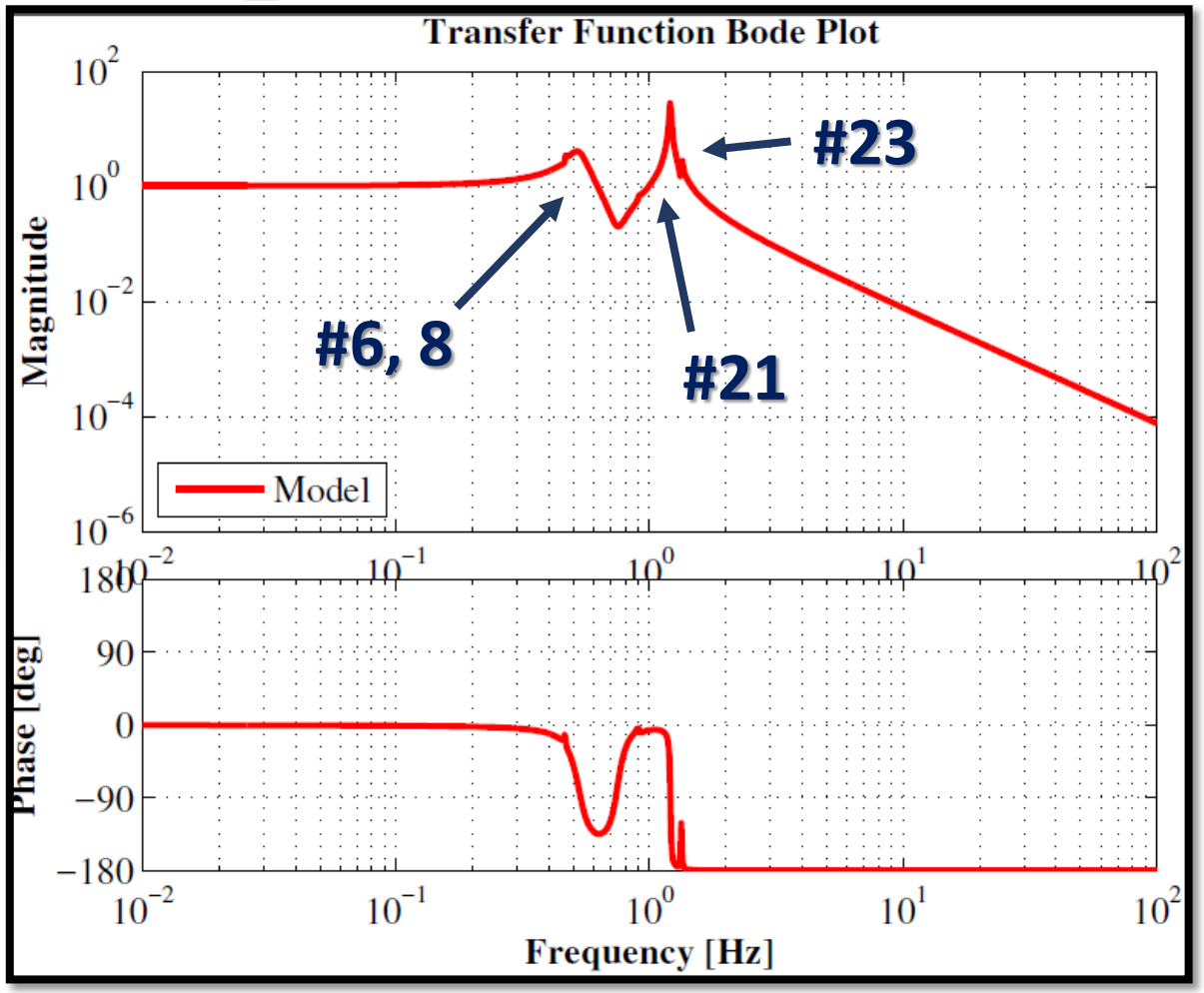




Force Transfer Function

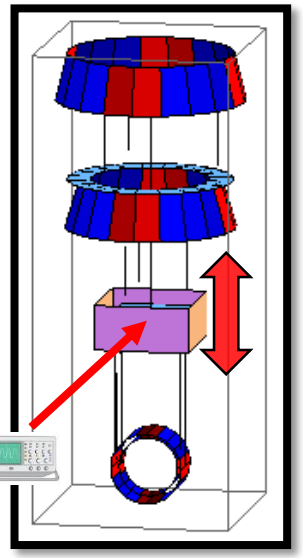
OSEM_TIM / actTIM

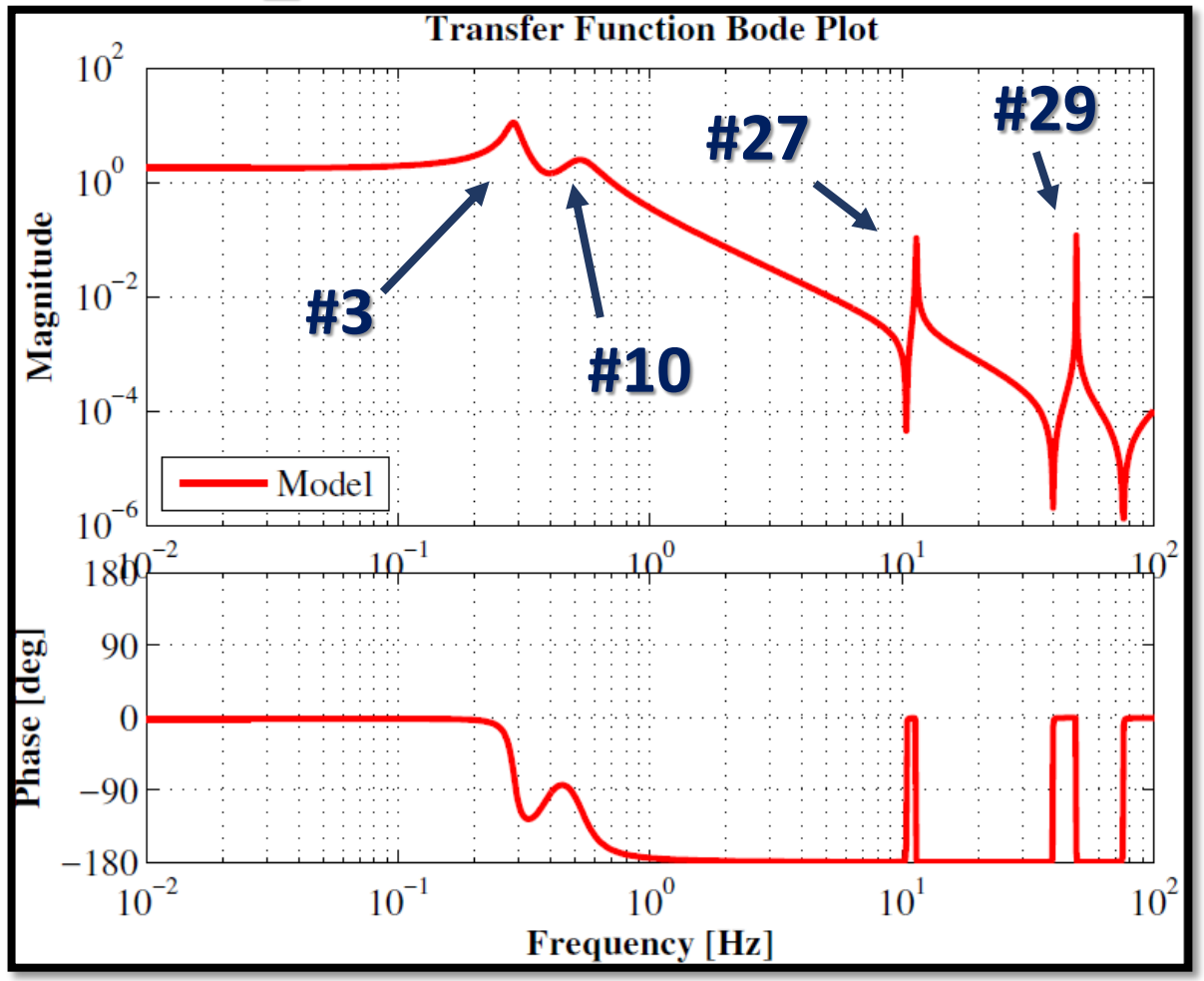




Force Transfer Function

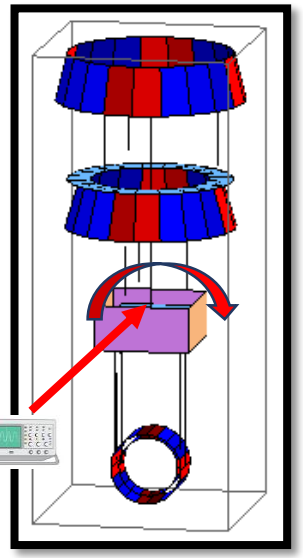
OSEM_VIM / actVIM

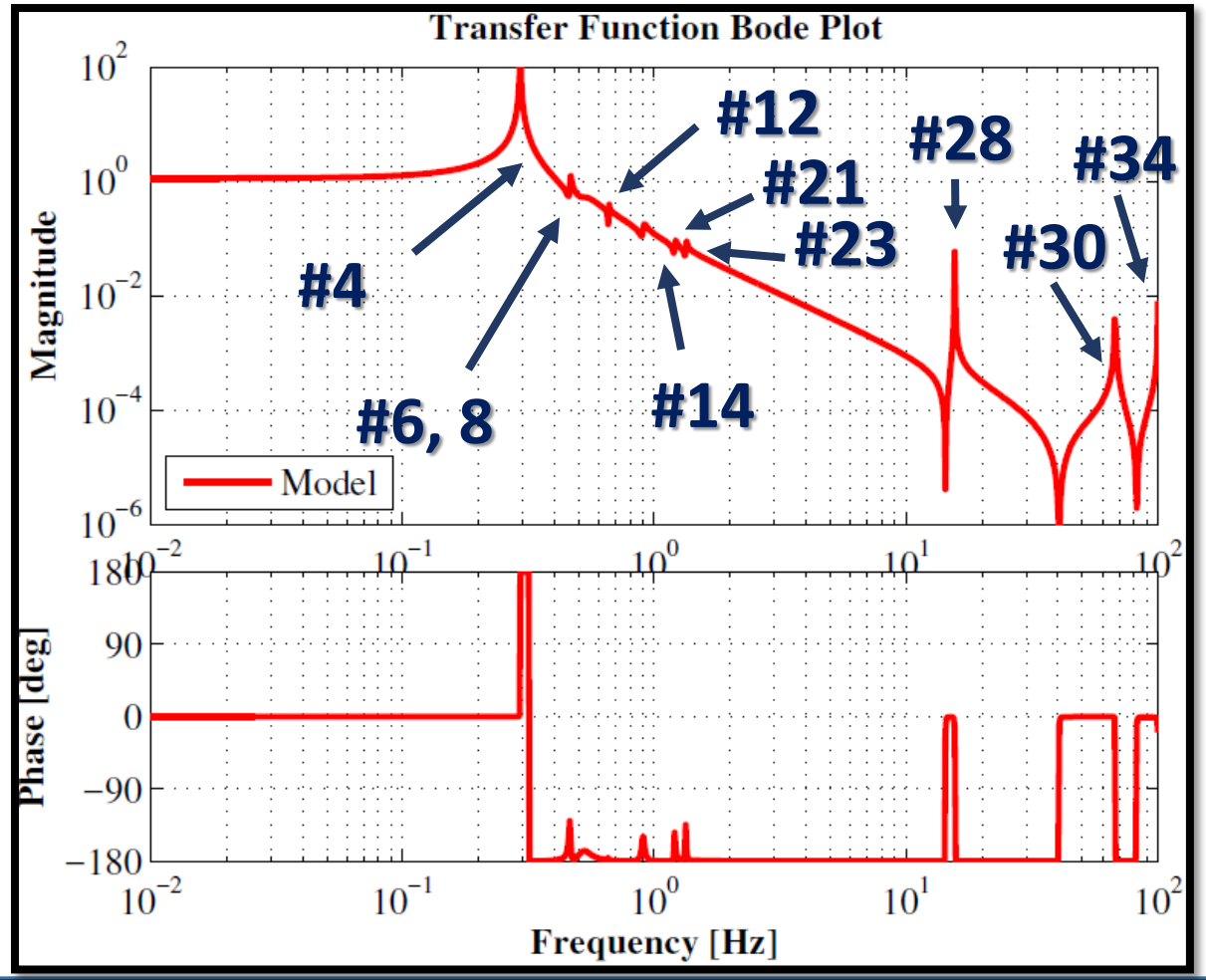




Force Transfer Function

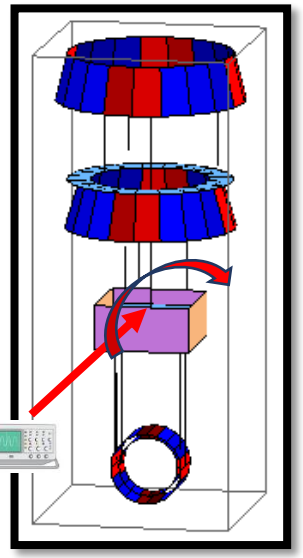
OSEM_RIM / actRIM

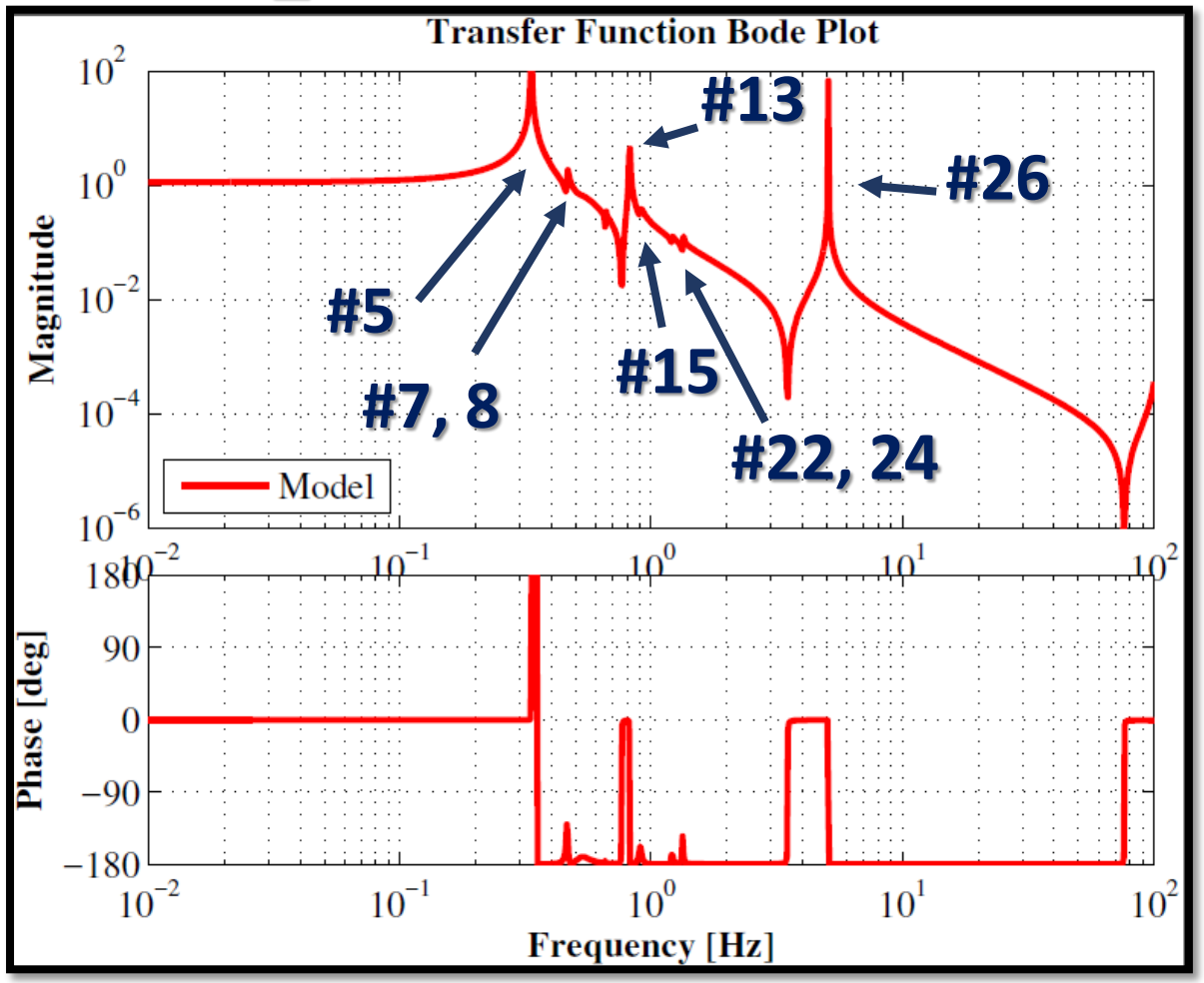




Force Transfer Function

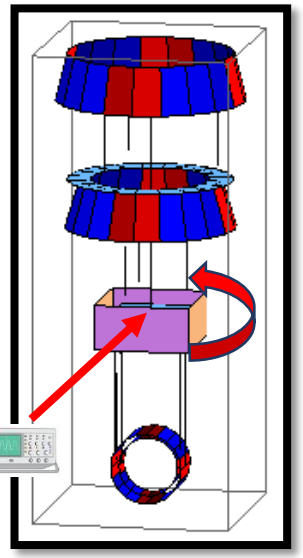
OSEM_PIM / actPIM

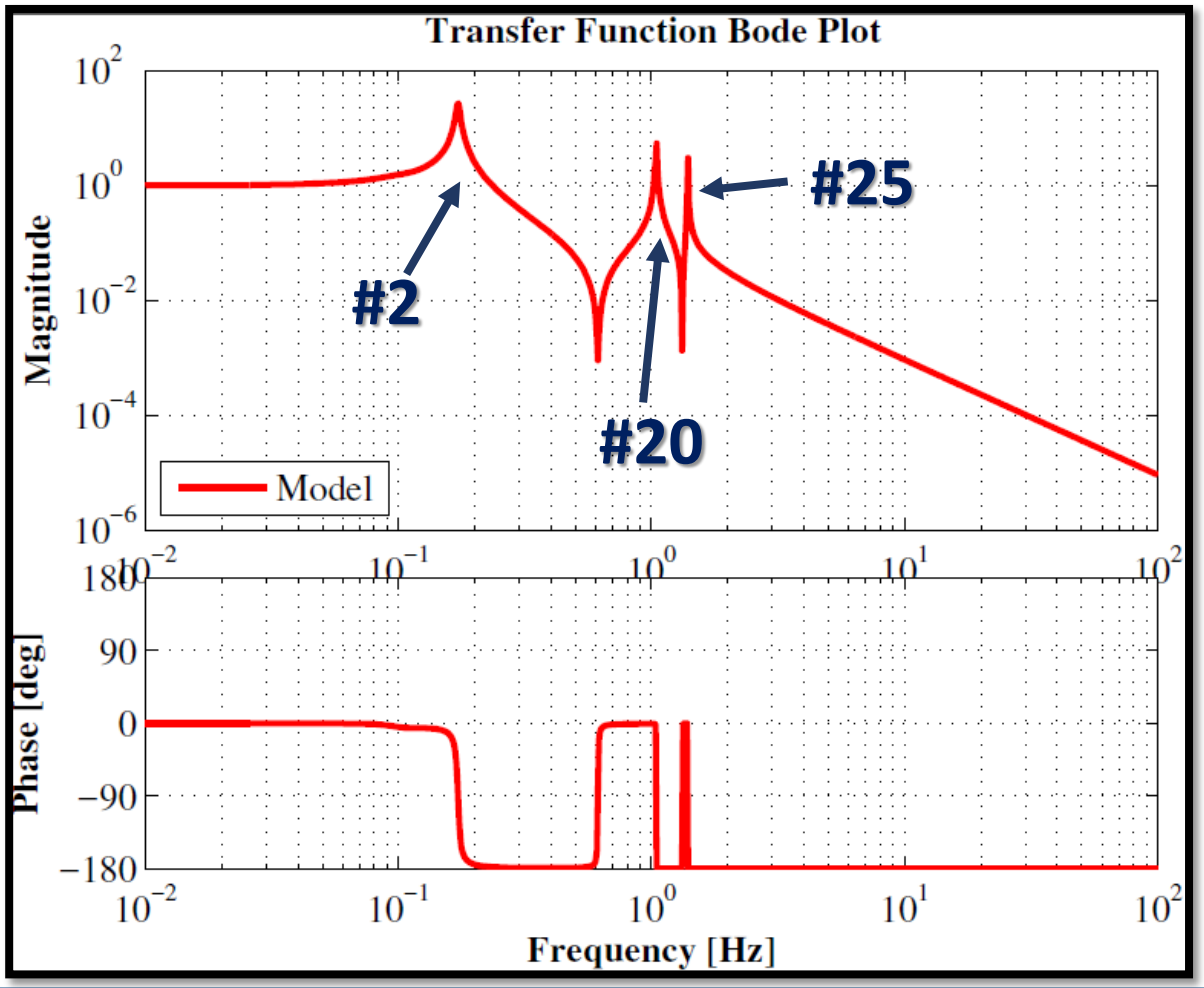




Force Transfer Function

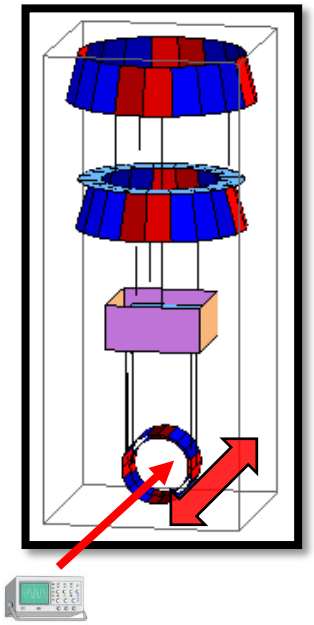
OSEM_YIM / actYIM

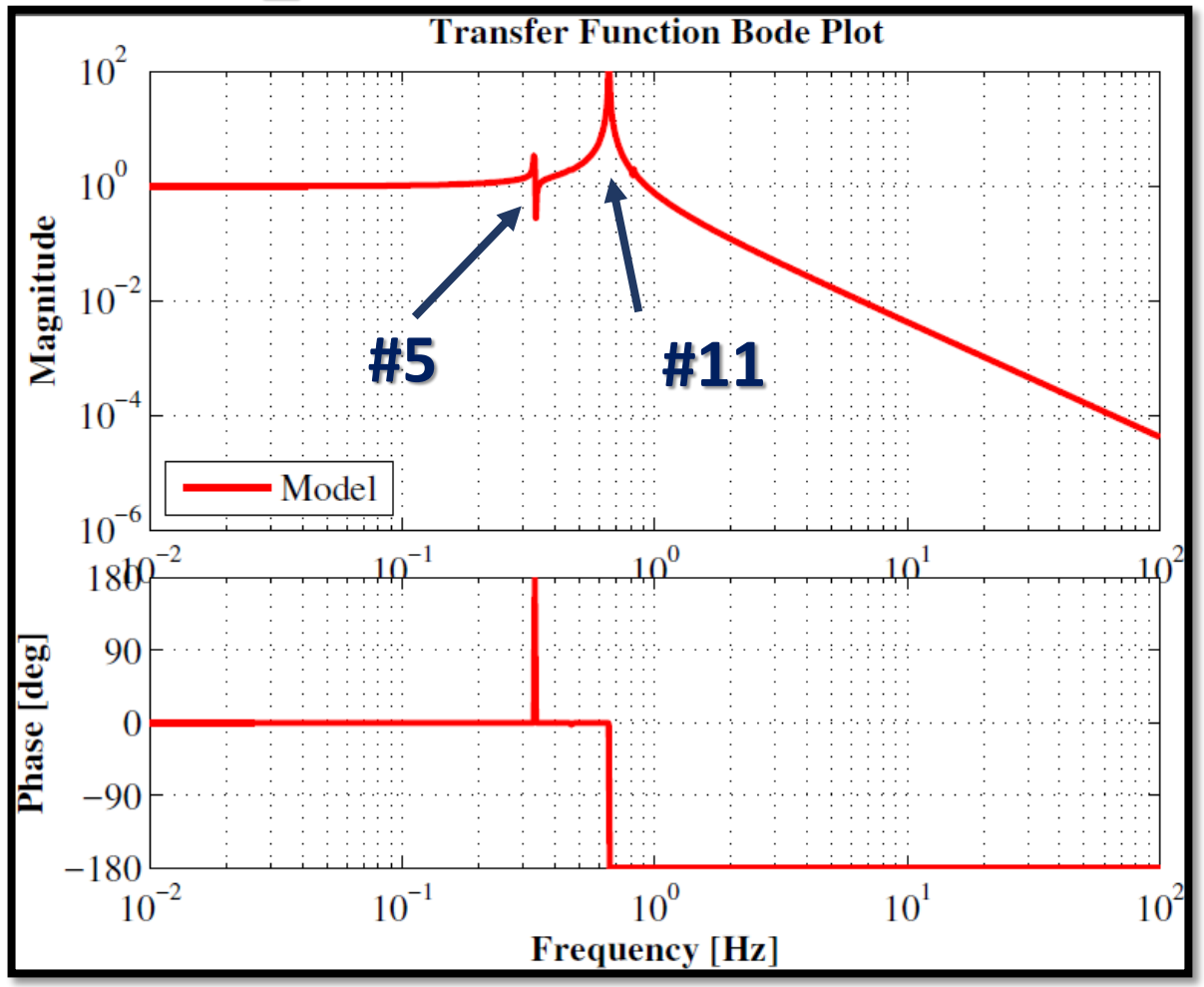




Force Transfer Function

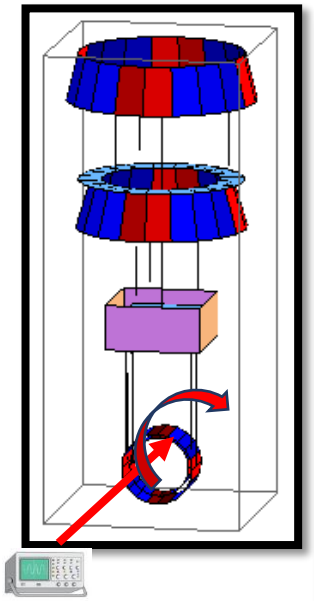
OSEM_LTM / actLTM

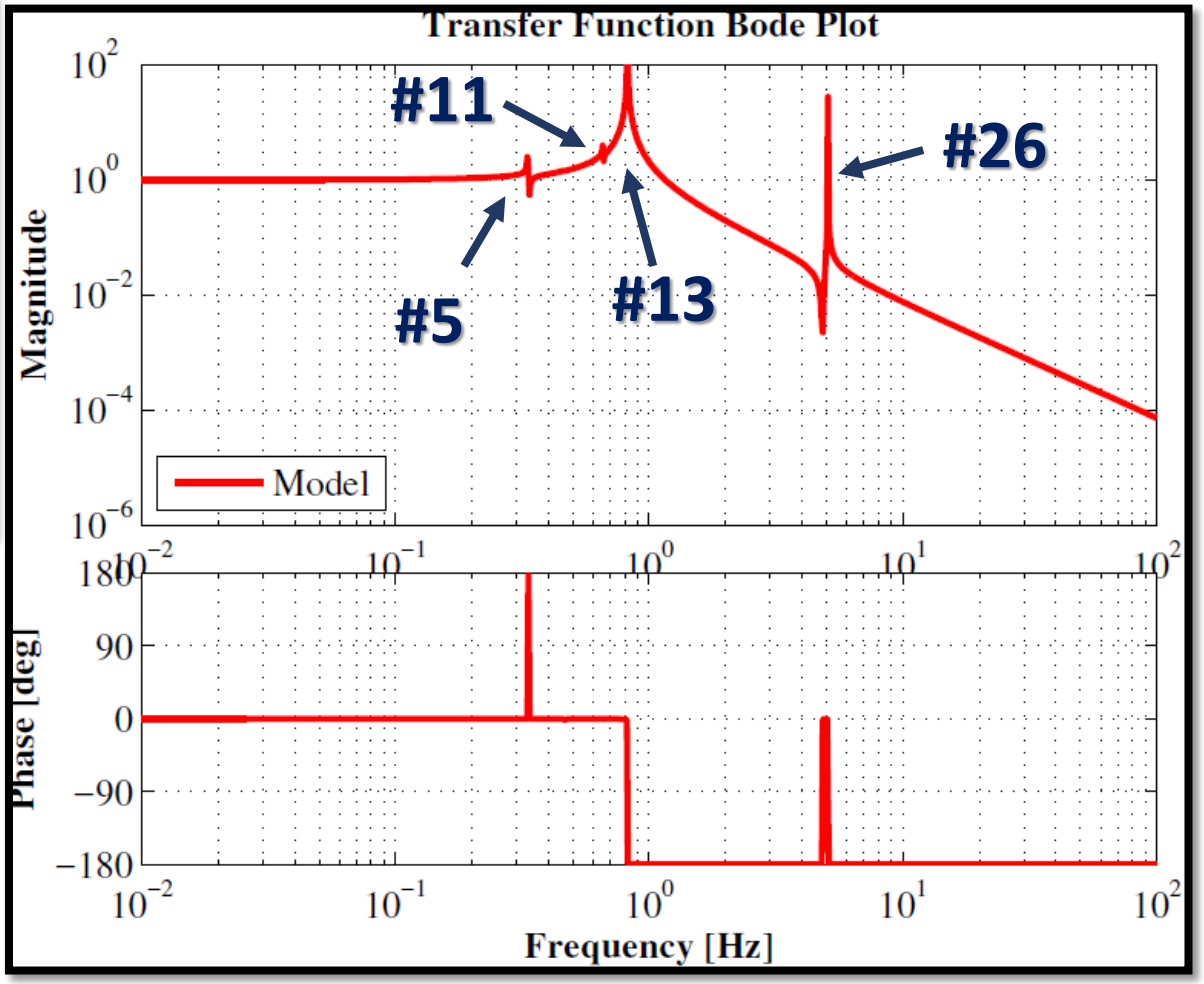




Force Transfer Function

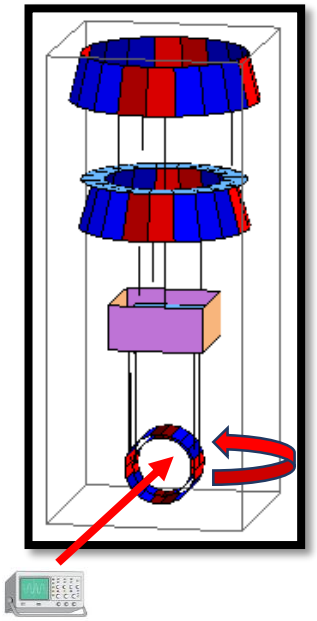
OSEM_PTM / actPTM

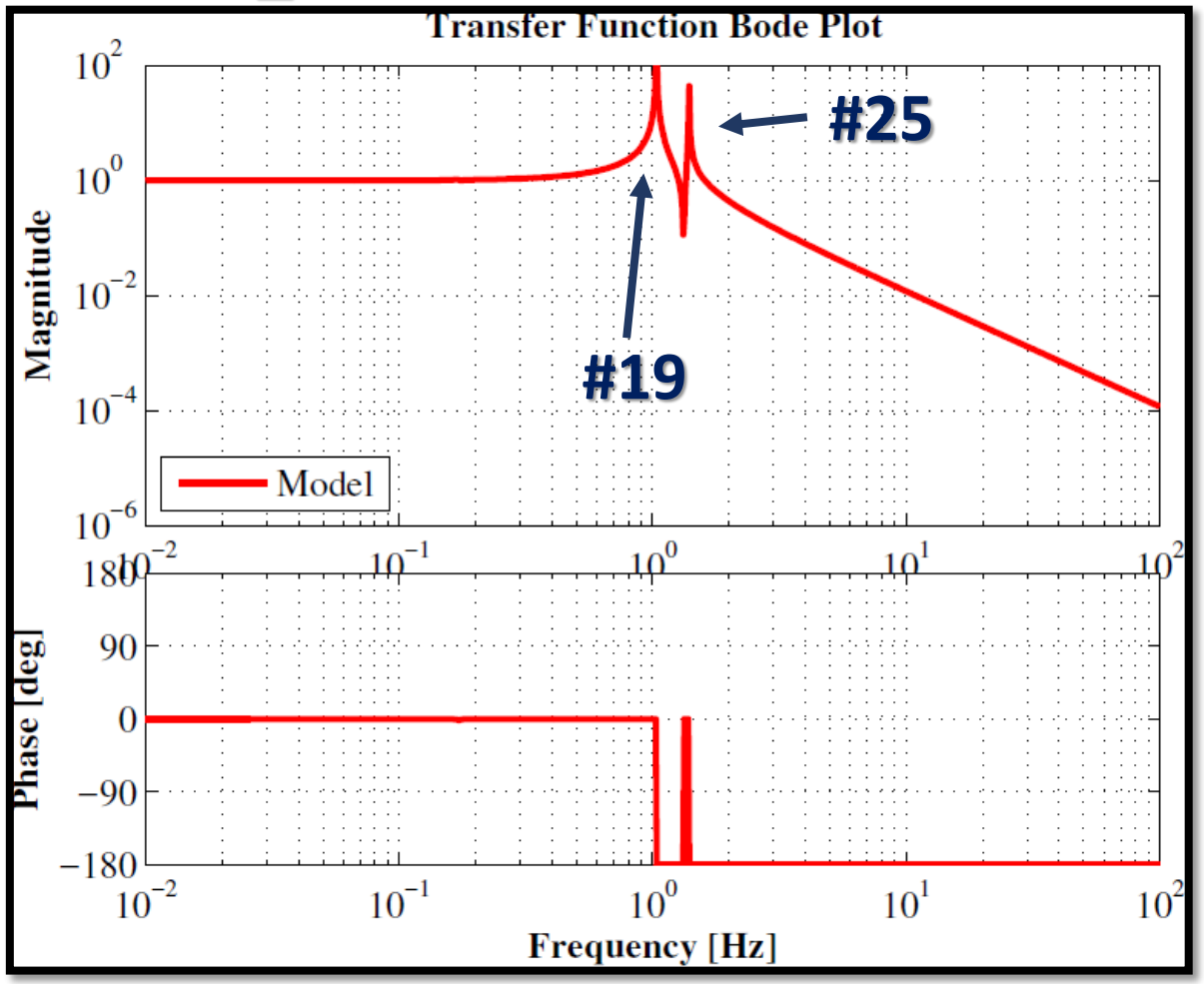




Force Transfer Function

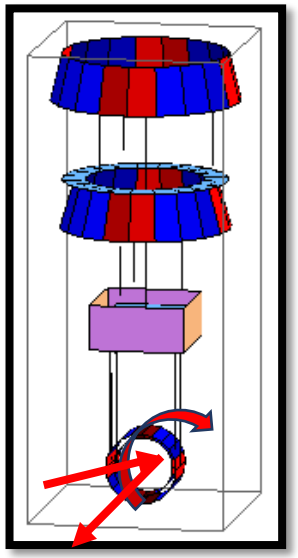
OSEM_YTM / actYTM

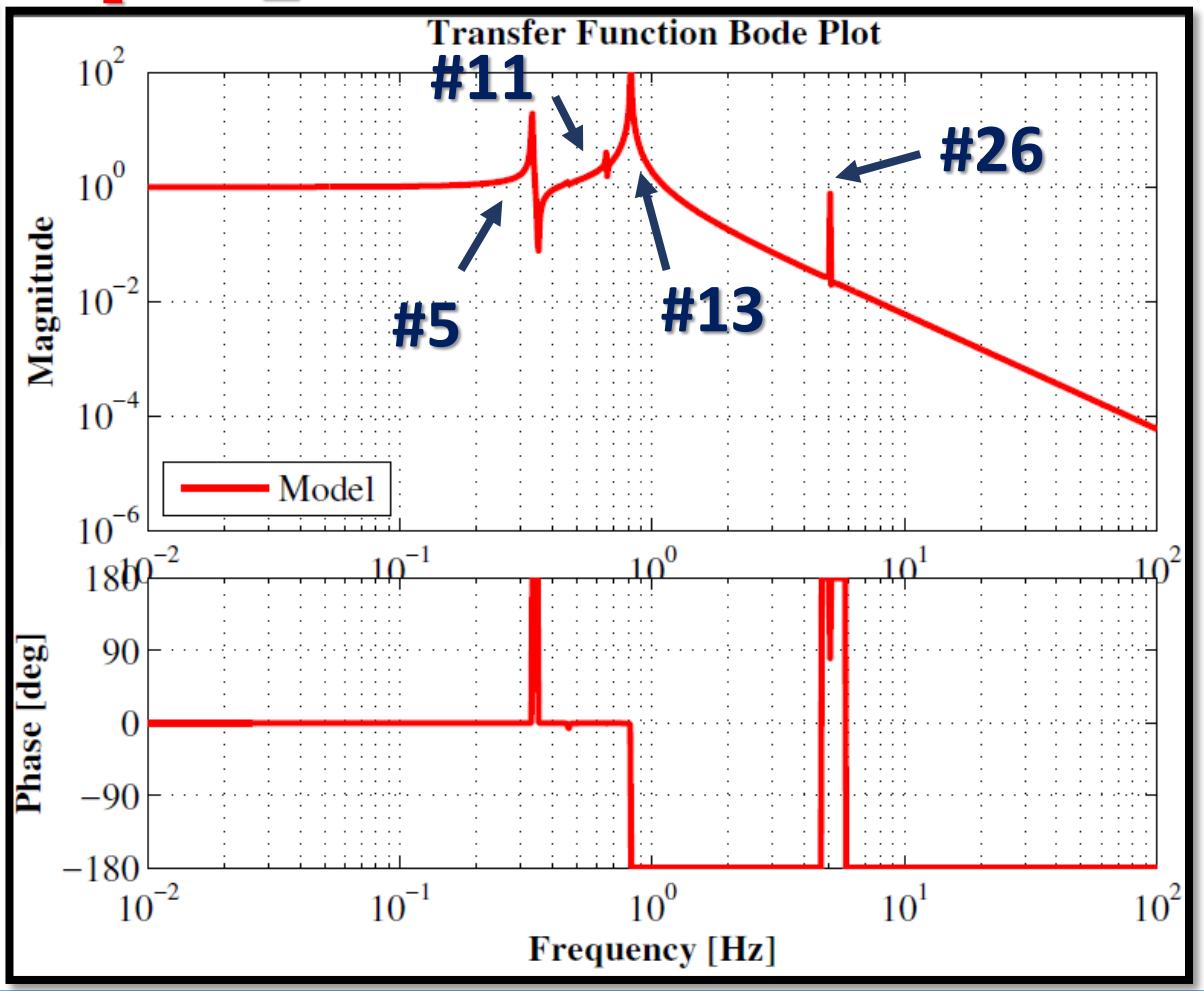




Force Transfer Function

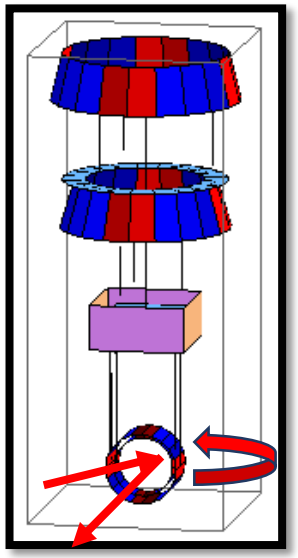
OpLev_PTM / actPTM

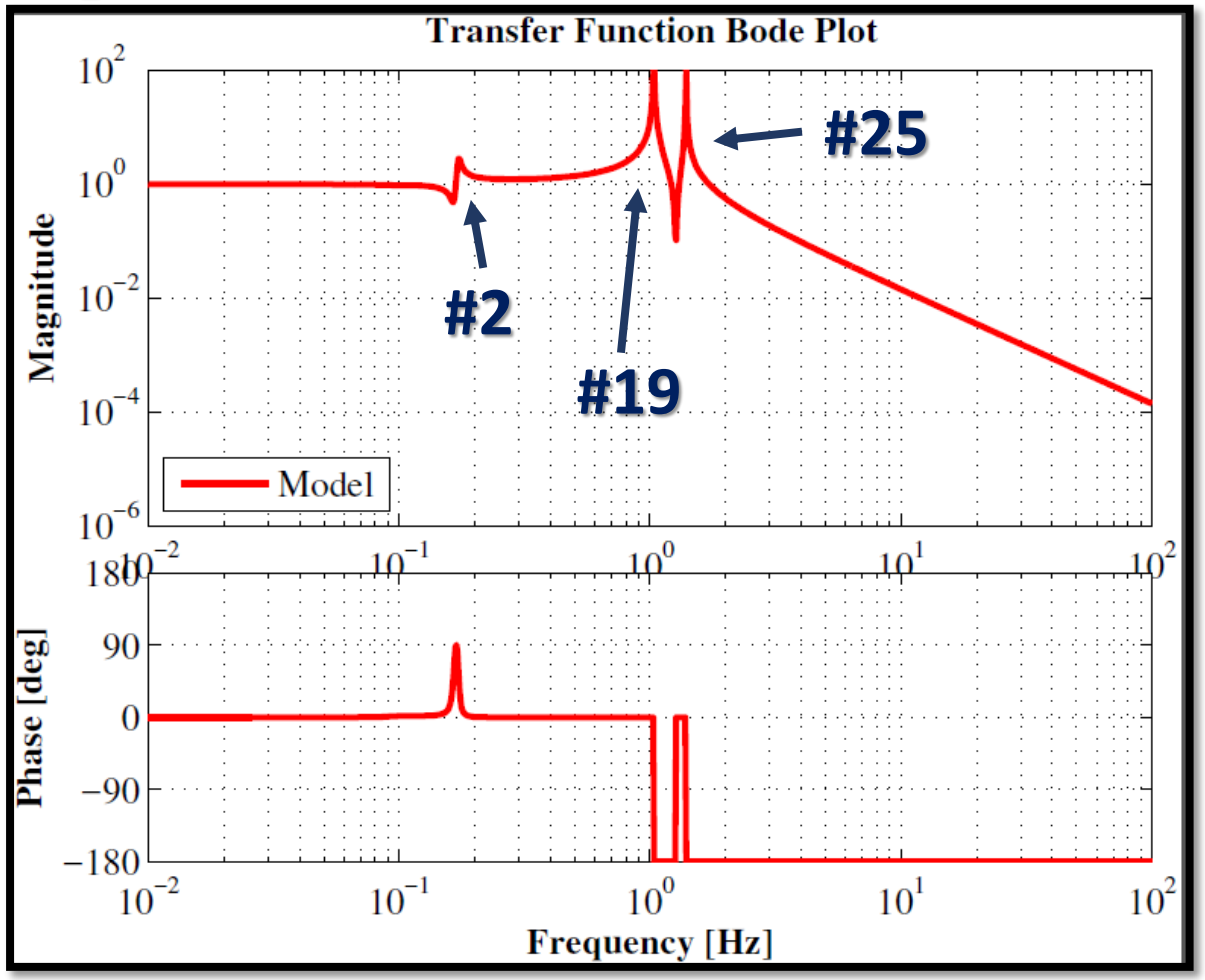




Force Transfer Function

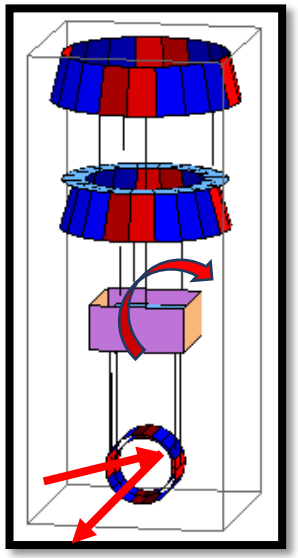
OpLev_YTM / actYTM

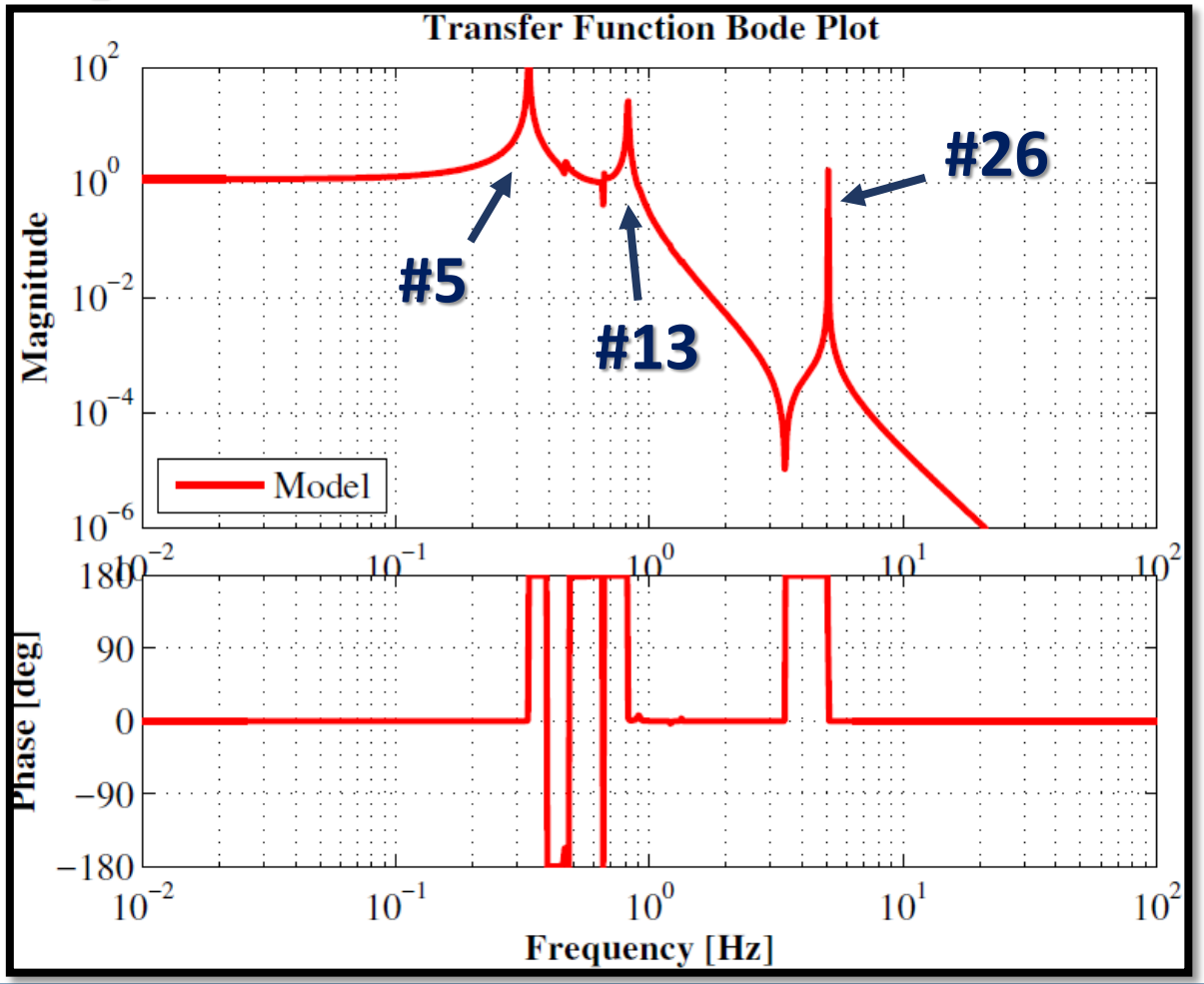




Force Transfer Function

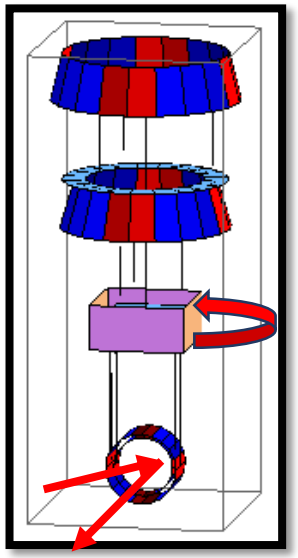
OpLev_PTM / actPIM

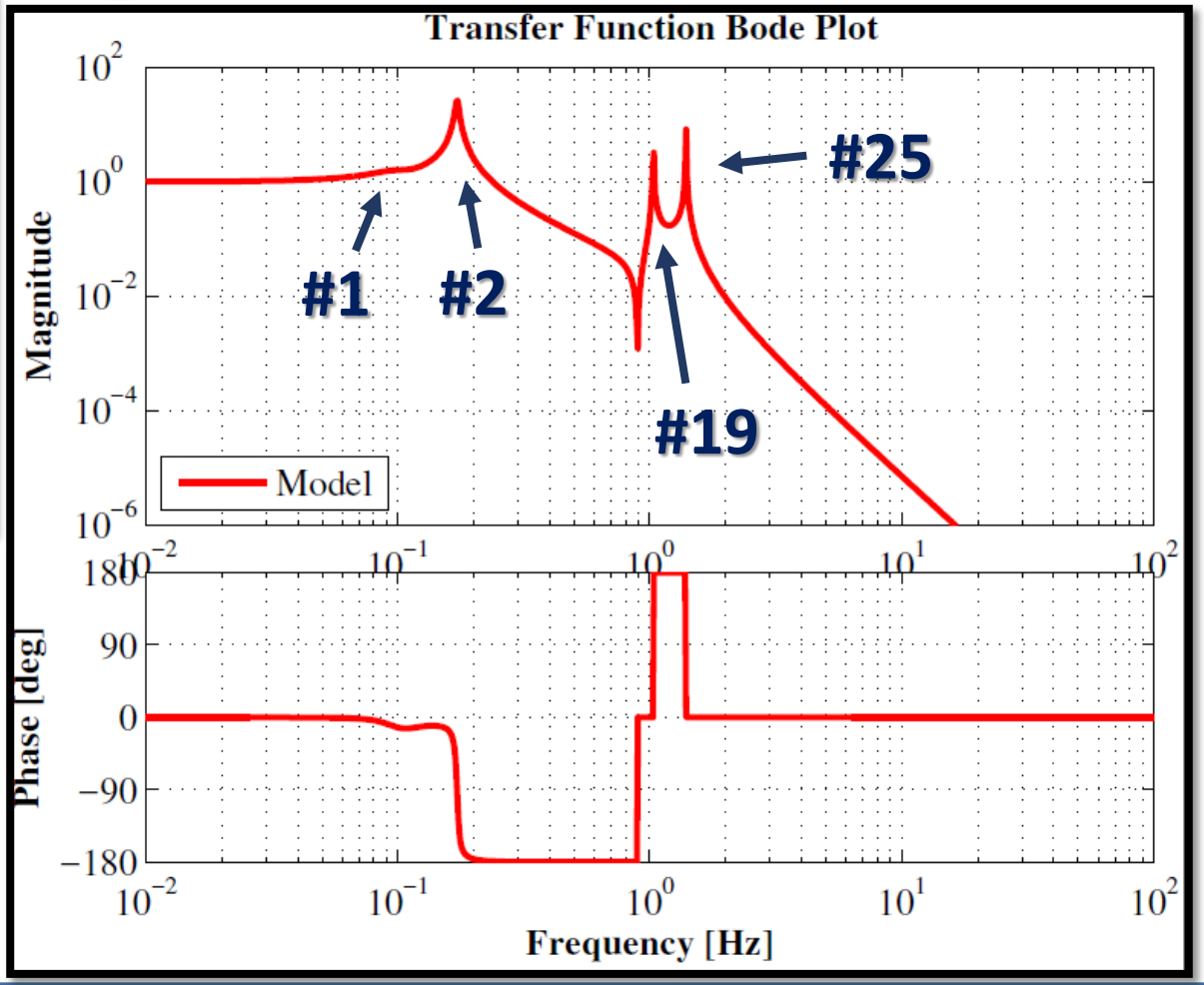




Force Transfer Function

OpLev_YTM / actYIM





Spectra

without control

using 90 percentile seismic noise

❖ From http://gwdoc.icrr.u-tokyo.ac.jp/DocDB/0039/T1503908/002/TypeBpDesign.pdf

2 Seismic noise level at the Kamioka site

The seismic displacement and velocity we used is shown in Fig.2 and ??[2]. This is the one called high-noise model. The seismic displacement in Kamioka is below this level for 90 % of time.

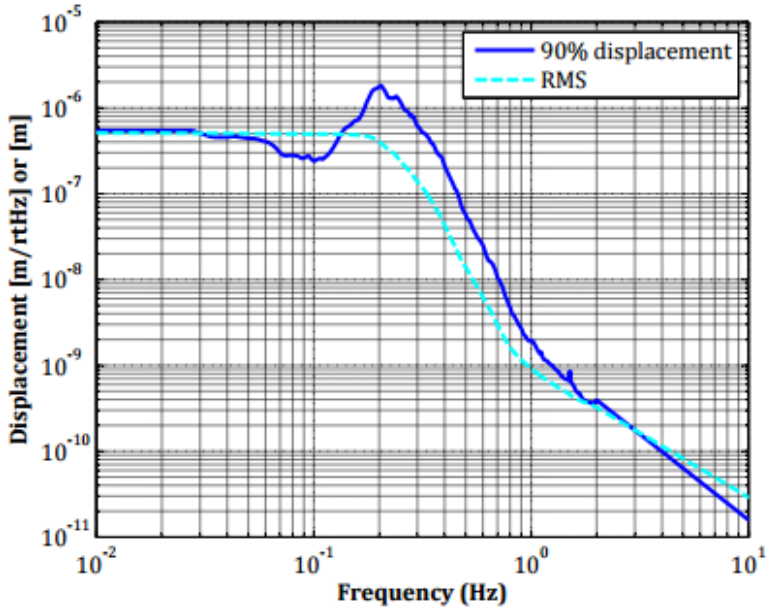


Figure 1: The high-level seismic displacement in Kamioka.

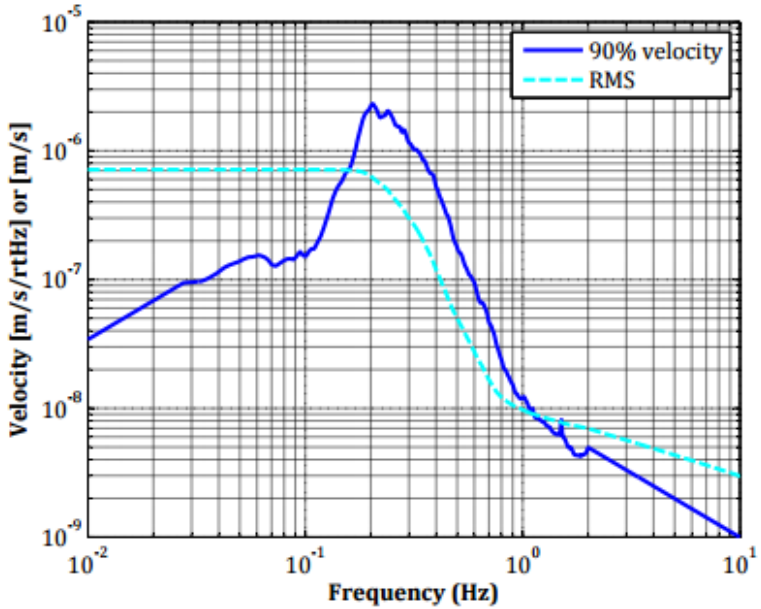
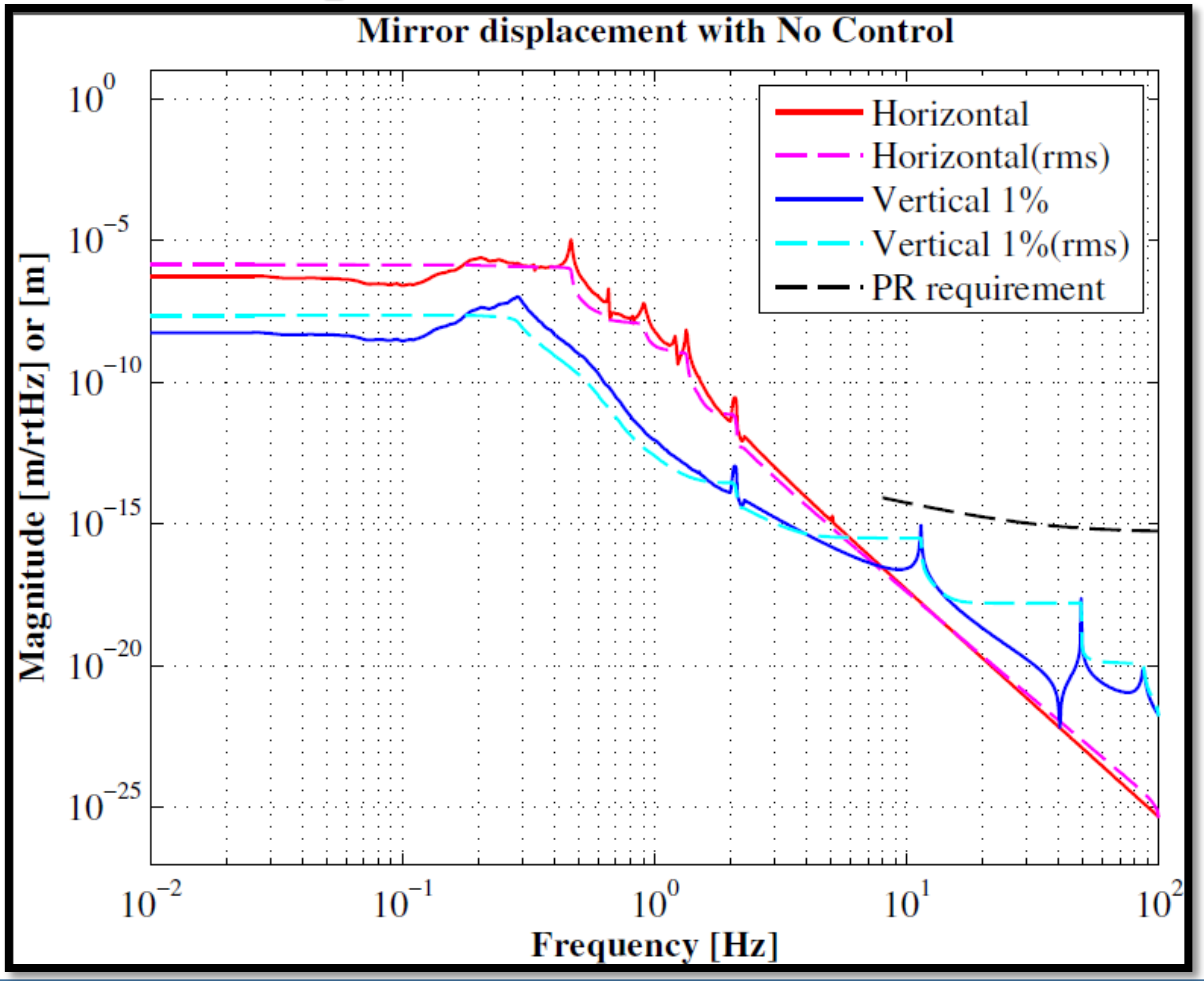


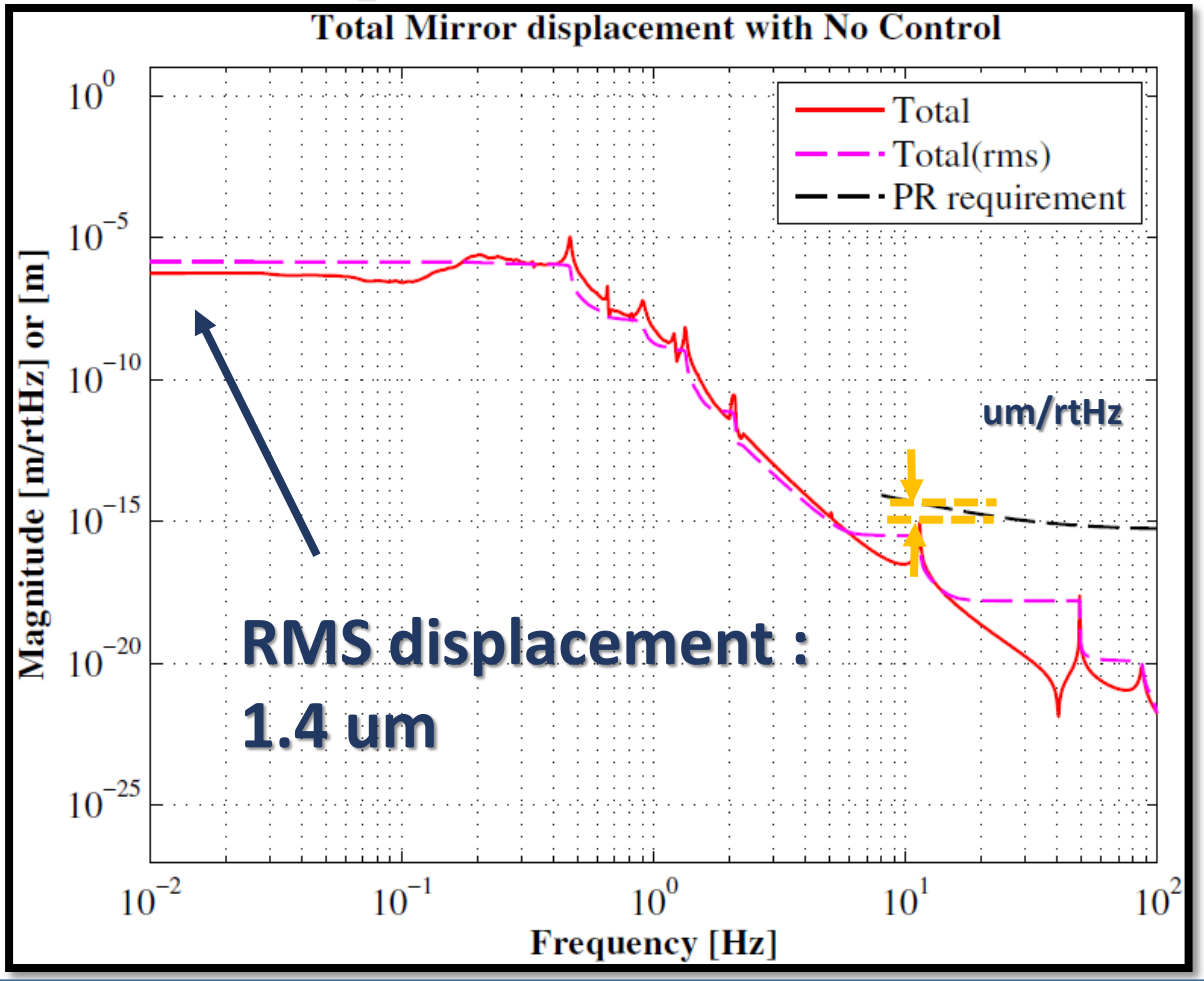
Figure 2: The high-level seismic velocity in Kamioka.

Spectra without ctrl

TM displacement : H and V 1%

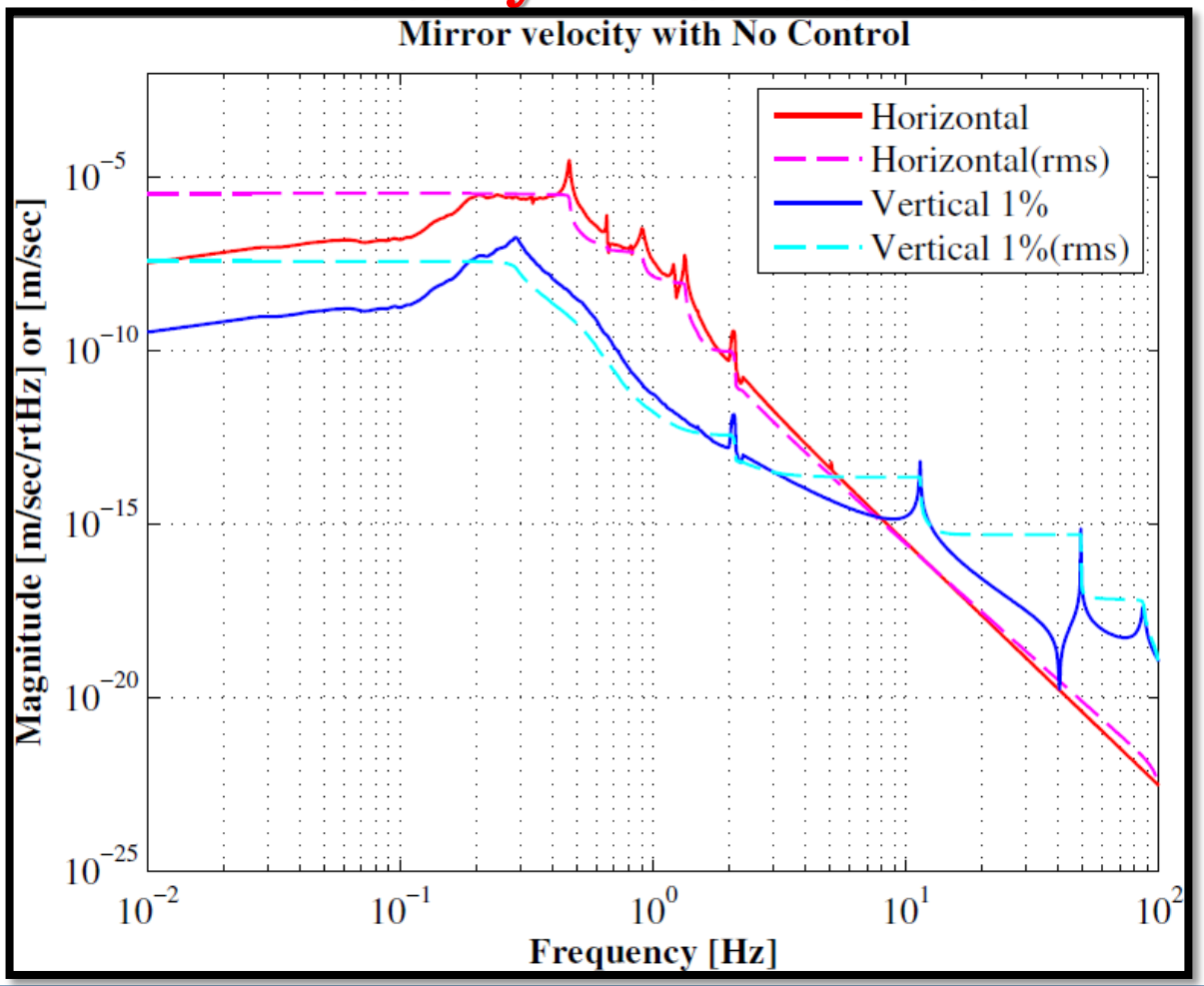


TM displacement : H + V 1%

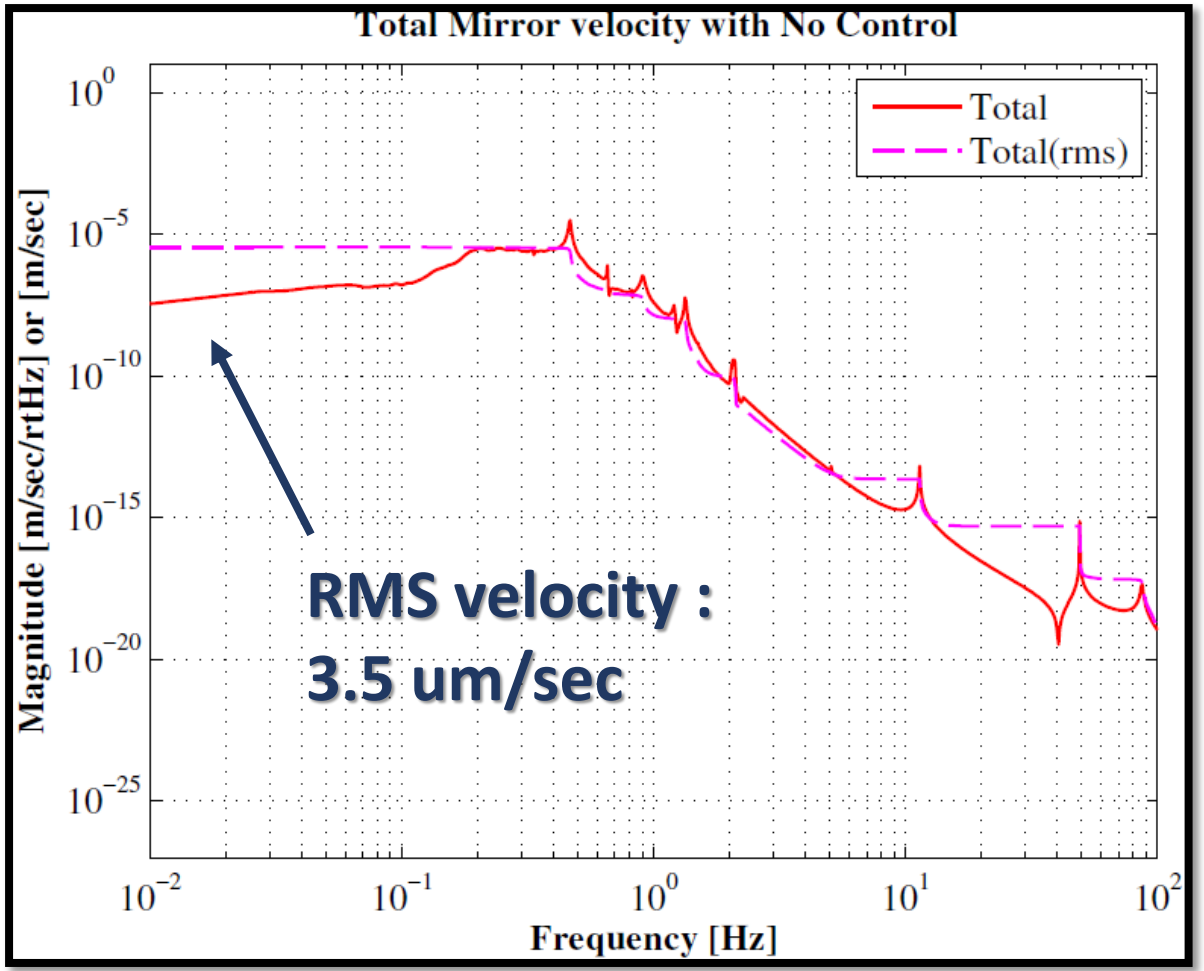


Spectra without ctrl

TM velocity : H and V 1%

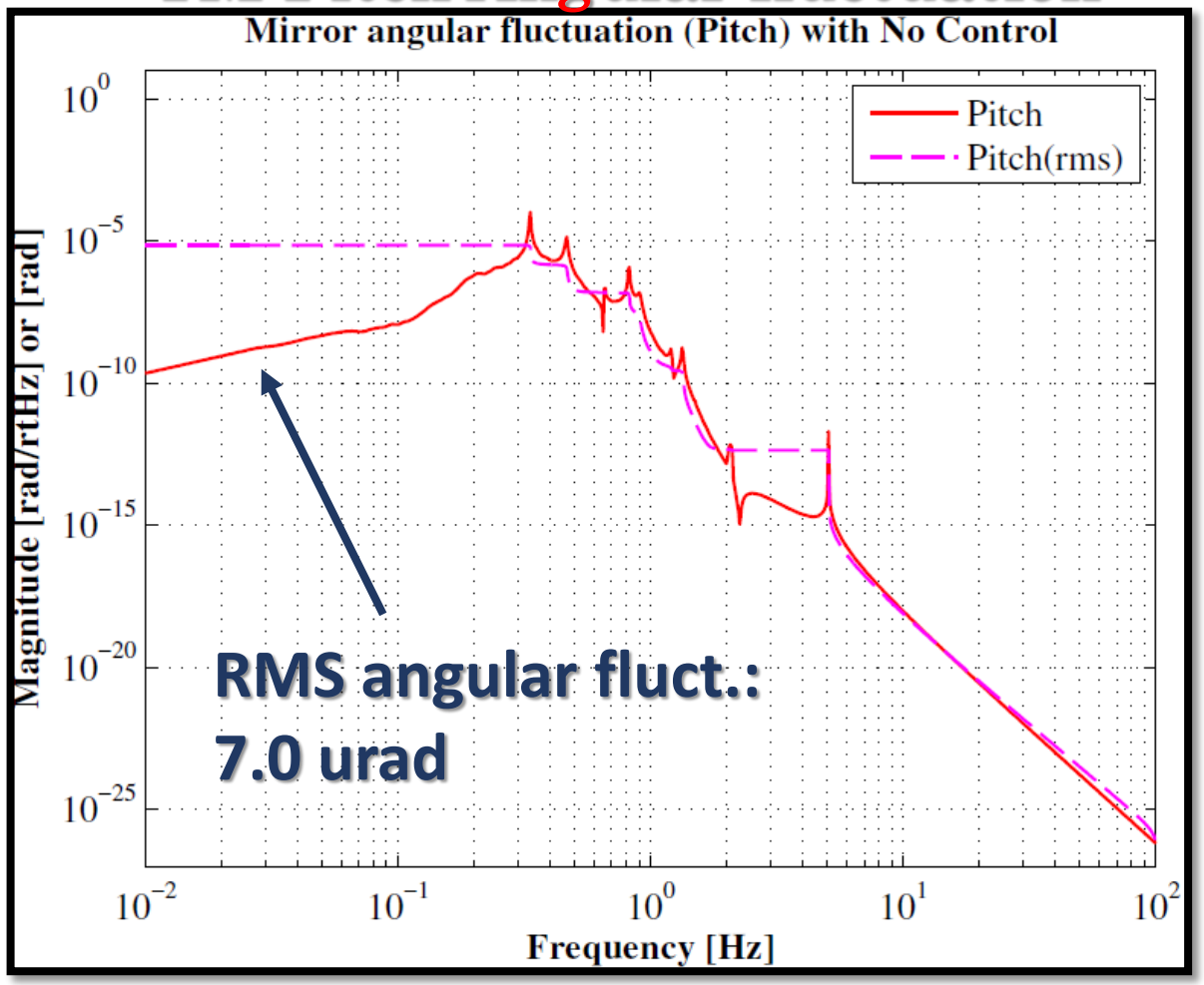


TM velocity : H + V 1%



Spectra without ctrl

TM Pitch Angular fluctuation

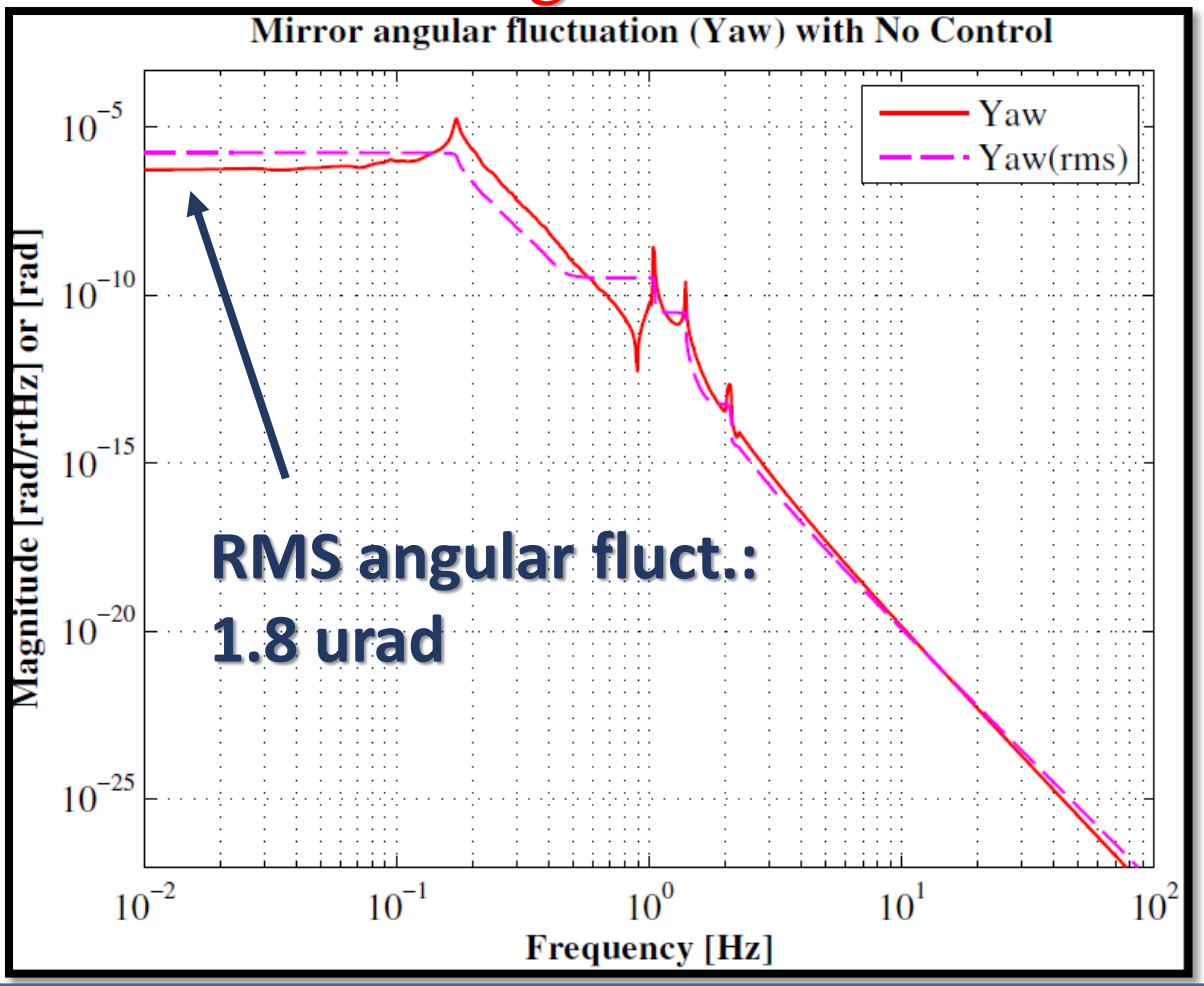


TM Pitch fluctuation excited by Longitudinal GND motion

Spectra without ctrl

TypeBp with MD

TM Yaw Angular fluctuation



TM Yaw fluctuation excited by Yaw GND motion

Control Simulation Results

Filter shape

OLTF

CLTF

Q factor in damping control

Impulse response