

LIGO Laboratory / LIGO Scientific Collaboration

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Parameters for current ETM/ITM main chain noise prototype design

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Rev 00: With comments from C. Torrie and M. Perreux-Lloyd

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Parameters for current ETM/ITM main chain noise prototype design. (all values in SI units)

g: 9.8100	Y1: 2.2000e+011
mn: 21.9600	Y2: 2.2000e+011
Inx: 0.4740	Y3: 7.0000e+010
Iny: 0.0704	ufcn: 2.3300
Inz: 0.4754	ufc1: 2.4800
m1: 22.1600	ufc2: 1.8100
I1x: 0.4921	dm: 0.0010
I1y: 0.0624	dn: 0.0010
I1z: 0.4953	d0: 0.0010
ix: 0.1300	d1: 0.0010
ir: 0.1570	d2: 0.0010
den2: 3860	d3: 0.0010
m2: 38.4000	d4: 0.0010
I2x: 0.4733	twistlength: 0
I2y: 0.2907	d3tr: 0.0010
I2z: 0.2907	d4tr: 0.0010
tx: 0.1300	sn: 0
tr: 0.1570	su: 0.0030
den3: 3980	si: 0.0030
m3: 39.6100	sl: 0.0150
I3x: 0.4830	nn0: 0.2500
I3y: 0.3020	nn1: 0.0900
I3z: 0.2920	n0: 0.2000
ln: 0.4450	n1: 0.0600
l1: 0.3085	n2: 0.1400
l2: 0.3400	n3: 0.1635
l3: 0.6000	n4: 0.1585
nwn: 2	n5: 0.1585
nw1: 4	tln: 0.4162
nw2: 4	t11: 0.2769
nw3: 4	t12: 0.3412
rn: 5.4000e-004	t13: 0.6020
r1: 3.5000e-004	l_suspoint_to_centreofoptic: 1.6363
r2: 3.1000e-004	l_suspoint_to_bottomofoptic: 1.7933
r3: 2.0000e-004	
Yn: 2.2000e+011	

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bd: 0

longpitch1: [0.3797 0.4408 0.9898 1.2736]

transroll1: [0.4464 0.7319 1.0058 2.0014]

longpitch2: [1.6838 1.9753 2.9580 3.3722]

transroll2: [2.6523 3.3586 3.7558 12.6362]

yaw: [0.6590 1.4025 2.4352 3.0997]

vertical: [0.6602 2.4795 4.1289 8.8326]

Notes

1) These numbers are generated by running the program quad_ref from the QUAD_April_04 set of MATLAB files, which have been updated to include amendments made since that time as the design has matured.

2) The naming conventions used for the various parameters can be found in LIGO-T040072.

3) The numbers for mass and moments of inertia for the top mass and upper intermediate mass are as provided by MPL in e-mails 29 Oct 04. The top mass numbers are 'As-Manufactured' SolidWorks numbers. The upper intermediate mass numbers are the current design, still being developed. More details on the design of the top mass and upper intermediate mass can be found in the documents LIGO T040071 and LIGO T040096 respectively. The original numbers for the top mass and upper intermediate mass, corresponding to simple blocks, and used as a reference against which to compare the detailed numbers as the design matures, are

m: 21.840, Ix: 0.4678, Iy: 0.0436, Iz: 0.4858

4) The blade parameters which come from the optimising routine opt.m, have been commented out, and replaced by the estimated uncoupled mode frequencies of each of the three stages with blades, based on the blade designs and masses which are currently being used. The details of the parameters for the three sets of blades which are being manufactured are given in a separate document: LIGO T040153.

5) The lever arms and the number of coils (in brackets) corresponding to the angular degrees of freedom, as specified in the current design, are

pitch 110 mm (1) , roll 160 mm (2), yaw 120 mm (2)

6) Two further useful references:

a) ETM Controls Prototype: Mass Estimate of an ETM Suspension Layout T030137-05,

b) ETM Controls Prototype Information Related to Design, T040013-05.