05/20/2011

LIGO-T1300528-v1

Virginio Sannibale

CryoPump Baffle (CPB) Transmissibility Along Beam Direction

Measurement of the longitudinal transmissibility of the CPB suspension prototype/first article using the structure to assemble, suspend, and balance the baffle.
Set up is far from ideal and therefore the measurement shouldn't be very accurate and precise but should still give a quantitative idea of the behavior of the baffle at high frequency between 10 to 100 Hz.

Working Folder: ~/AOS/CPB/Lab/20110520.CPBS.Proto.Transmissibility.Y.02

Set-up

Suspension

Prototype. first article suspension
Glazed baffle
Payload: Nominal + one Teac accelerometer

Damper

None

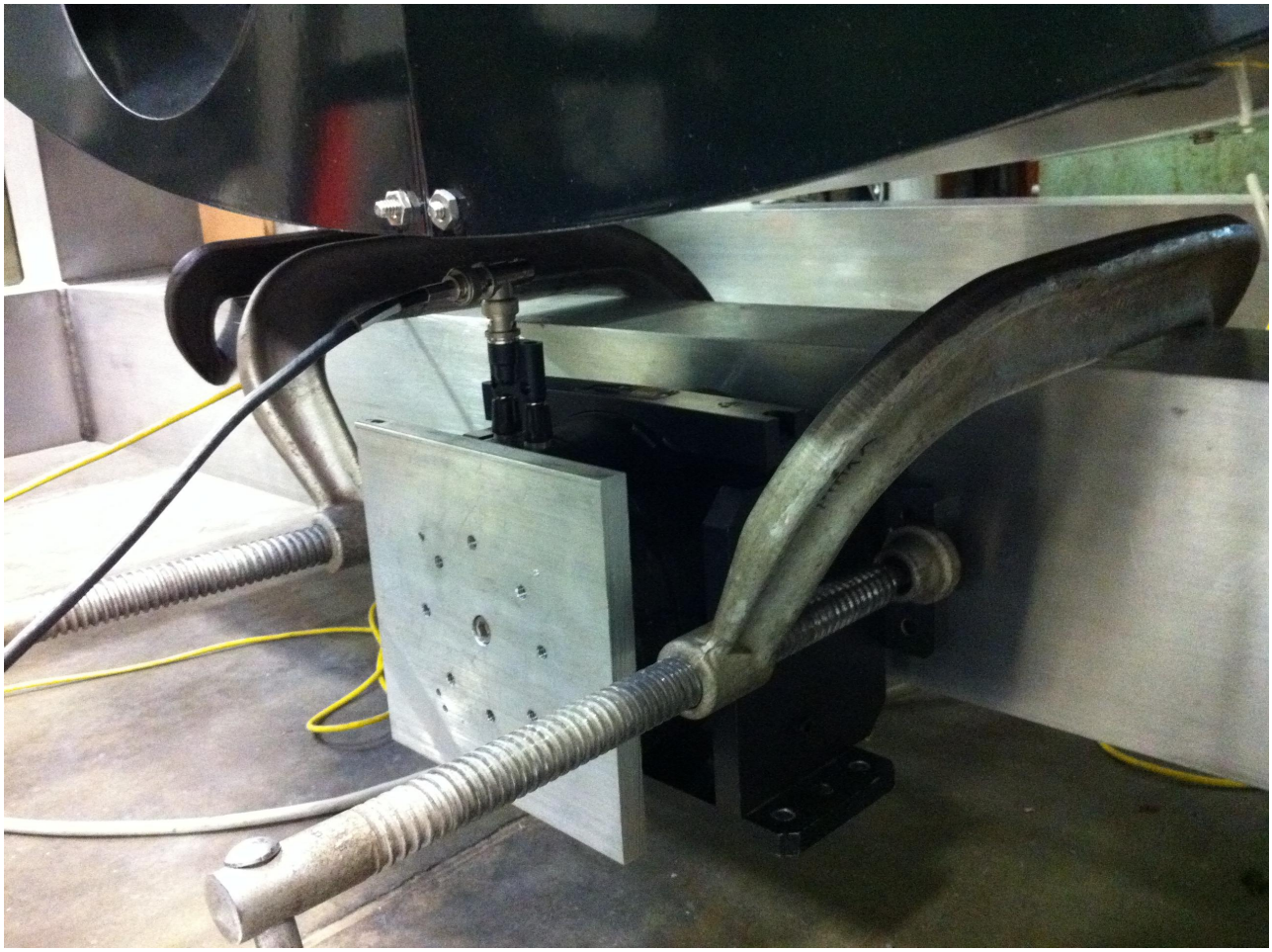
Excitation

B&K 4809 large shaker with an aluminum plate attached
plate mass ? kg
placed on the bottom beam of the frame blow the baffle
Connected to Virgo amplifier

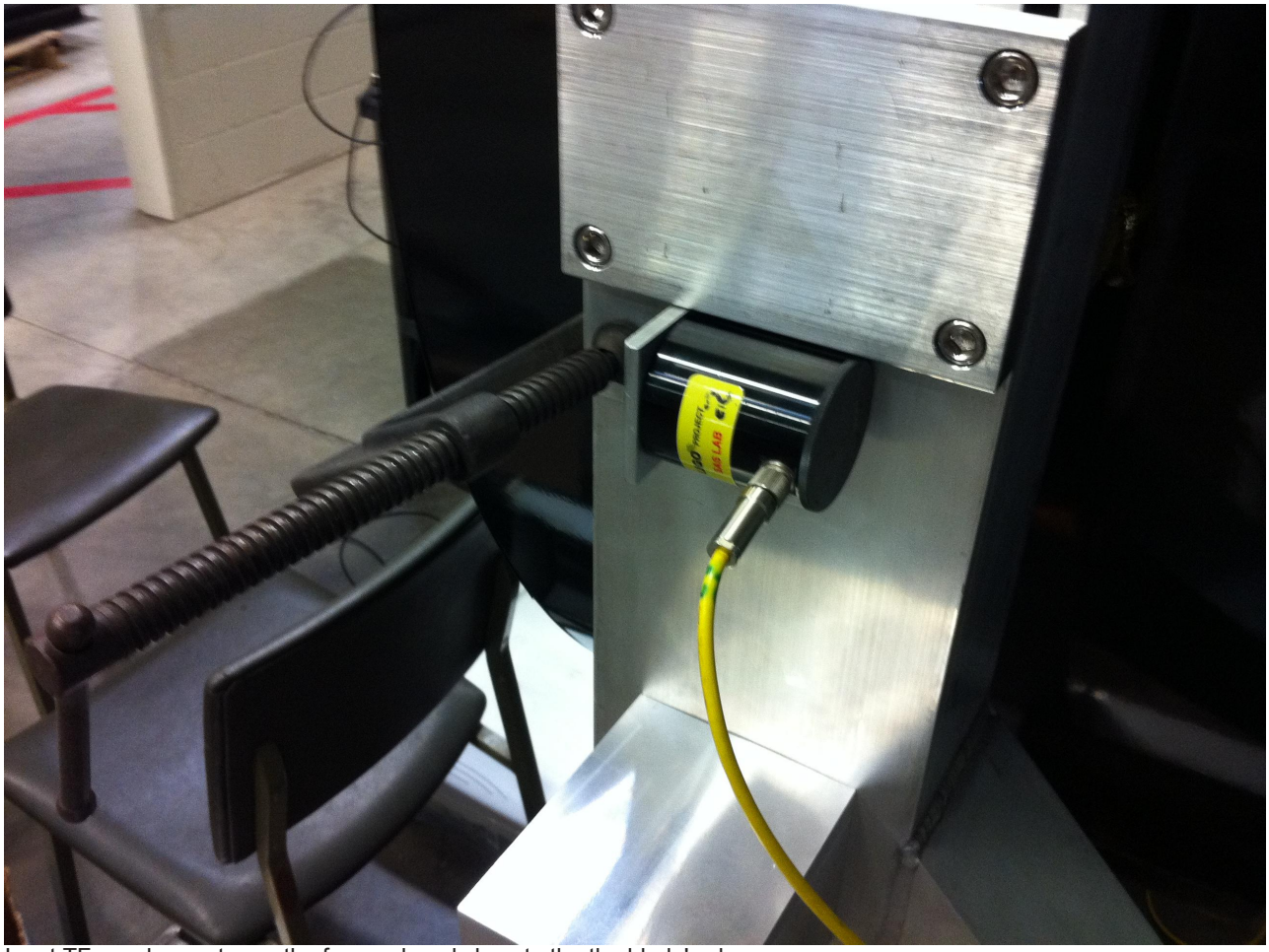
Sensors

TEAC Amplifier Accelerometer TEAC P/N 710

Channel	gain	Filter	Orientation	Position
[#]	[#]	[Hz]	[#]	
1	1	300	longitudinal	on the frame next to the blade clamp
2	1-5	300	longitudinal	inside the tube



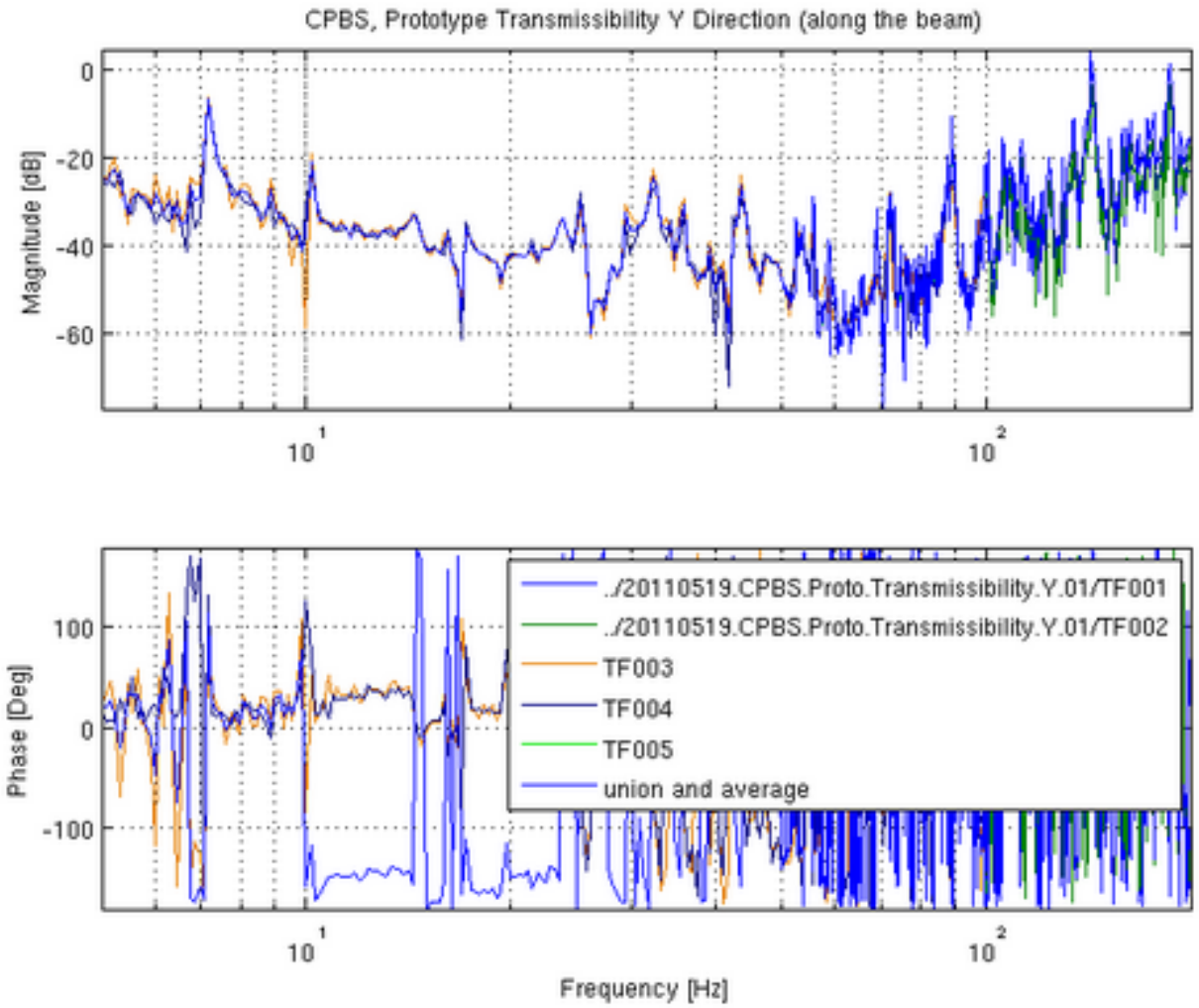
Shaker connection to the the CPB frame



Input TF accelerometer on the frame placed close to the the blade's clamp

Output TF accelerometer connected to the baffle.

Measurement



Transmissibility along the longitudinal direction repeated using different amplitudes and number of averages

Conclusion

Measurements are repeatable and agree reasonably well. Coherence measured by the SR785 showed the usual bug because values were above one. The measurements seems to indicate an average attenuation of 39.2dB between 10 Hz and 100 Hz. This result seems optimistic and should be confirmed with a less "kludgy" set-up. The effective attenuation is expected to change depending on the position of the output accelerometer because of the poor stiffness of the baffle. In other words, the baffle plates internal modes start at low frequency below 10 Hz and therefore photons impinging onto those surfaces should see more motion than the one on the internal tube. The Output TF accelerometer was placed probably in one of the stiffest point of the baffle because it was the only point that it could be attached to the baffle. The measurements should be retaken with lighter accelerometers placed on the baffle plates