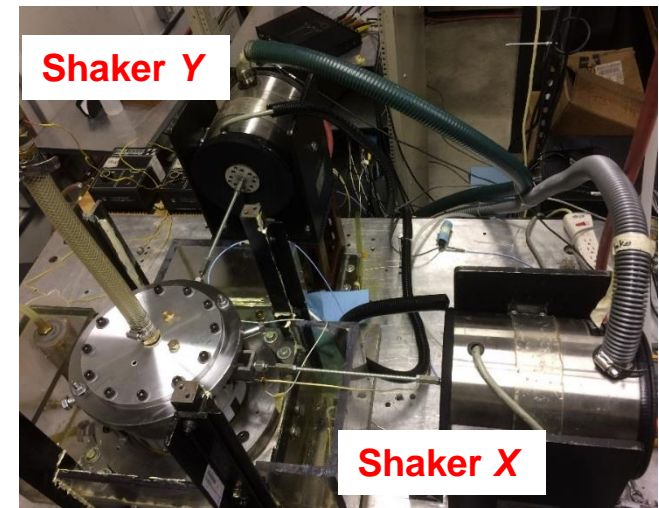
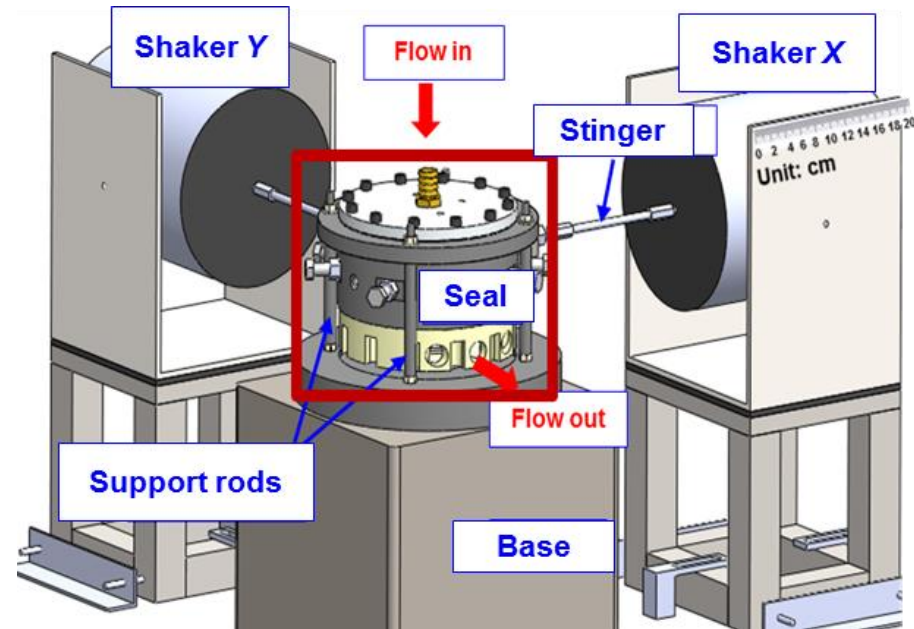


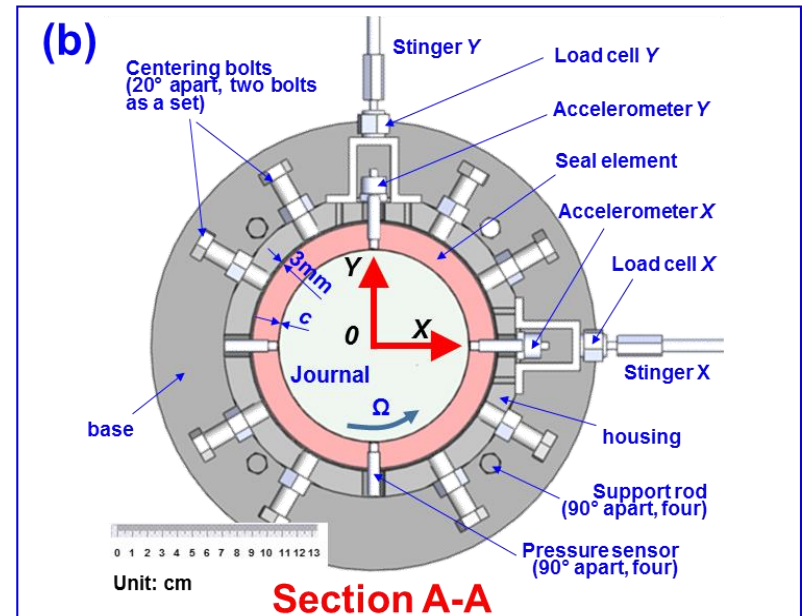
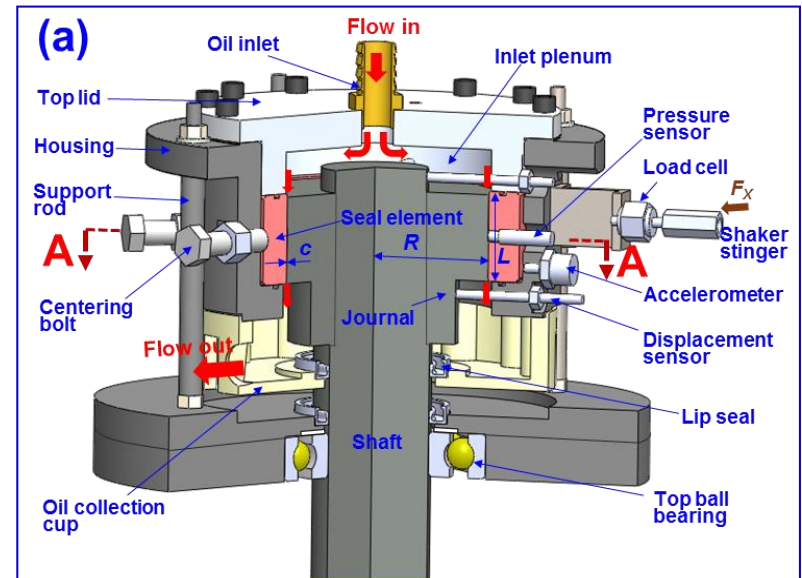
# Wet seal test rig

- Test section supported by four flexible rods (similar to a squeeze film damper rig).
- A DC motor drives the shaft via a belt with a gear ratio of 1.8.
- 2 electromagnetic shakers excite seal housing, max.  $\pm 445$  N (90° apart).



# Structure and instrumentations

- Test seal located in a seal housing, seal is easily interchangeable.
- 8 bolts with 1/2-20 threads (1.25 mm/revolution) center the seal during installation and operation.
- 2 load cells, 2 accelerometers, 4 eddy current displacement sensors, 2 K-type thermal couples.
- LabVIEW code records voltage signals from sensors.



# Impact load test for structure parameters

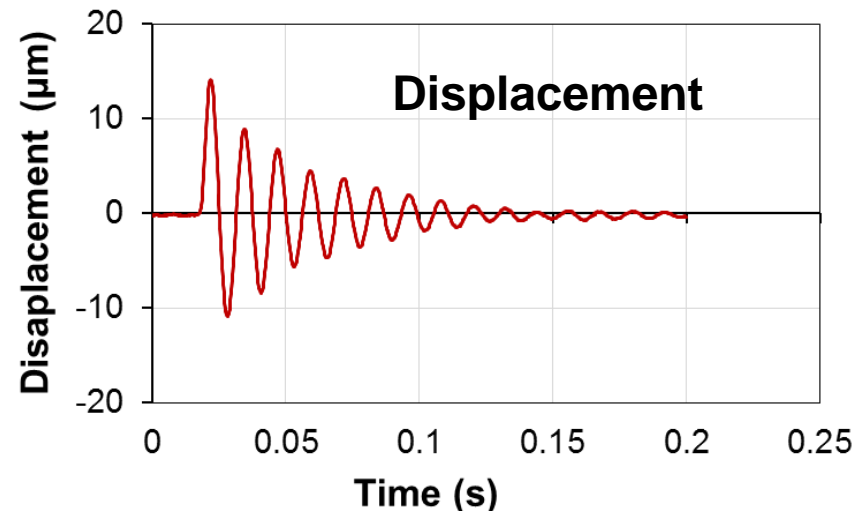
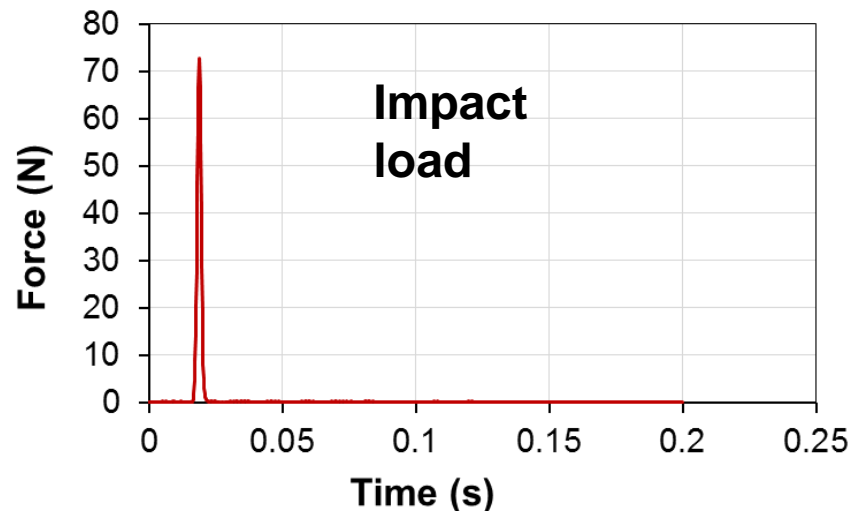
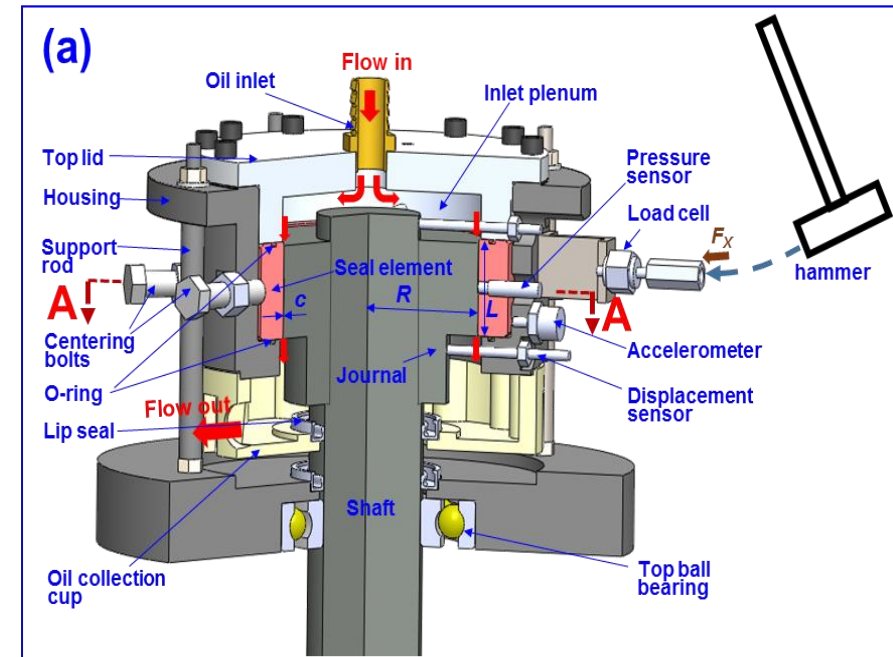
Equation of motion for seal housing:

$$M_s a = F - (K_s z' + C_s \dot{z}')$$

Sampling rate:  $f_s = 5,120$  samples/s

Sampling time:  $t = 0.2$  s

Data points: 1,024



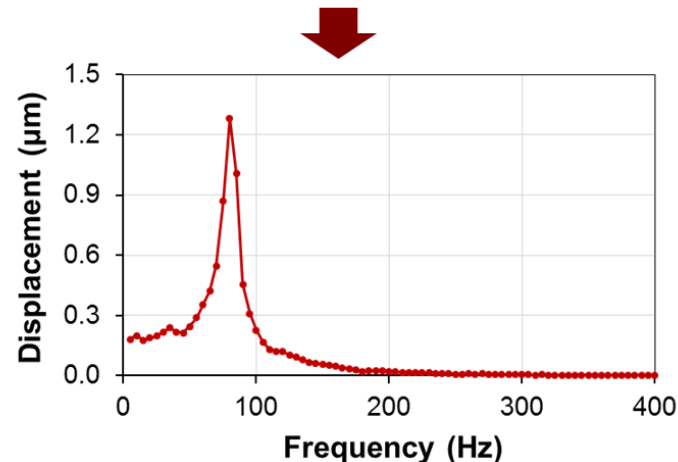
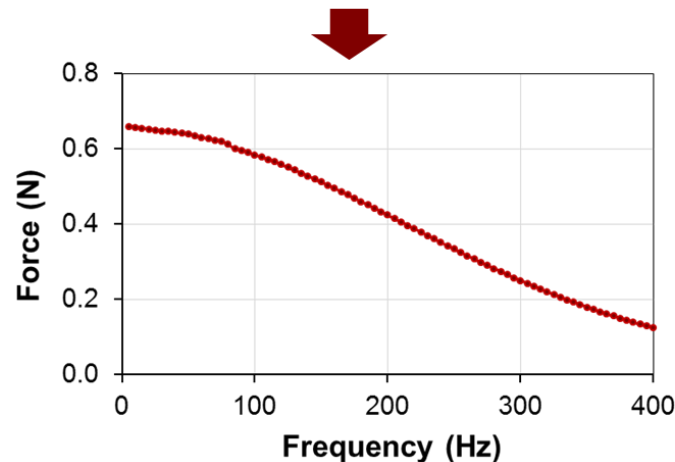
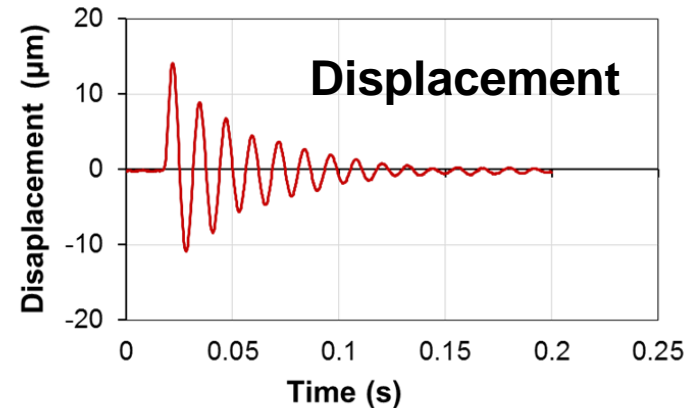
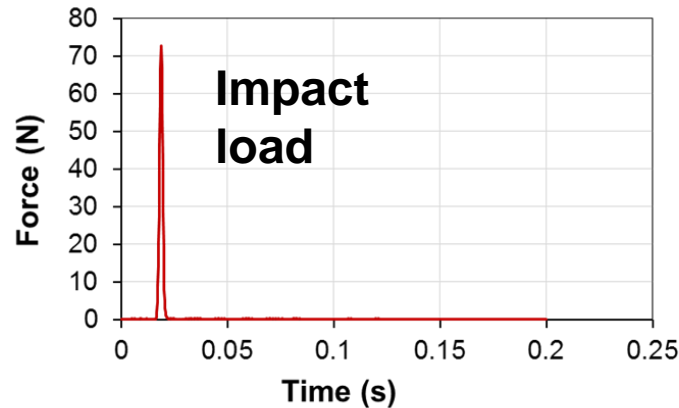
# Impact load test for structure parameters

Transfer time domain data into the frequency domain for parameter identification.

Frequency increment for FFT:  $\Delta f = 1/t = 5 \text{ Hz}$ .

Max frequency:  $f_{max} = \frac{1}{2} f_s$  (below graph only show data from 0 to 400 HZ)

Averaged 20 times in the frequency domain.



# References ← Learn more

San Andrés, L., and Lu, L., 2018, “On the Leakage and Rotordynamic Force Coefficients of Pump Annular Seals Operating with Air/Oil Mixtures: Measurements and Predictions,” II Asia Turbomachinery and Pump Symposium, The Turbomachinery Laboratory, Texas A&M University, Mar. 13–15, Singapore, <http://hdl.handle.net/1969.1/172516>

San Andrés, L., Yang, J., and Xu, L., 2019, “On the Leakage, Torque and Dynamic Force Coefficients of an Air in Oil (Wet) Annular Seal: a CFD Analysis Anchored to Test Data,” ASME J. Eng. Gas Turbines Power, Vol. 141(2), 021008, DOI: 10.1115/1.4040766

San Andrés, L., and Lu, X., 2018, “Leakage, Drag Power and Rotordynamics Force Coefficients of an Air in Oil (Wet) Annular Seal,” ASME J. Eng. Gas Turbines Power, Vol. 140(1), 012505. DOI: 10.1115/1.4037622