Flow Induced Vibration of X-ray Optics

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Introduction:

1. State the reason why flow induced vibration is an important issue in beam line design
2. Review some about previous researches about flow-induced vibration
3. What are we going to accomplish in this project: investigate a new kind of hose and using computer simulation to gain more understanding about vibration factors in our model

Methodology:

1. How we modeled the optics in hands-on experiment: only include the dummy optics, plate and hose
2. Two methods we used to measure pressure along the flow path: fixed ports positions for piezo transducers and flexible catheter
3. How we simplified the optics (focusing on how to get the stiffness of each mounting) and prepared for analysis in computer simulation

Hands-on measurement results:

1. Pressure spectrum from the transducers fixed along the block and discuss about the pressure variation along flow path
2. Measurements about the relationship between flow rate and vibration level of the block
3. A comparison of the vibration situation between original hose and the new hose

Computer simulation:

1. Compare structural analysis results with hand calculation based on experiment measurements
2. Compare modal analysis (vibration frequency) results with measurements
3. Hose simulation results

Summary:

1. The benefits (if any) of the new hose
2. The relationship between flow rate and vibration level
3. Pressure situations under different flow rates in our optics
4. Evaluation of the simulation in a general view