

Structural Deformation in CLIC modules

24th August 2022

Ryan Ghent

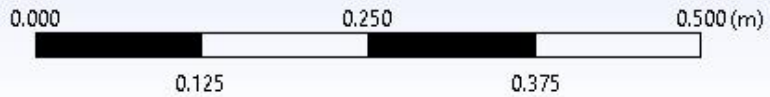
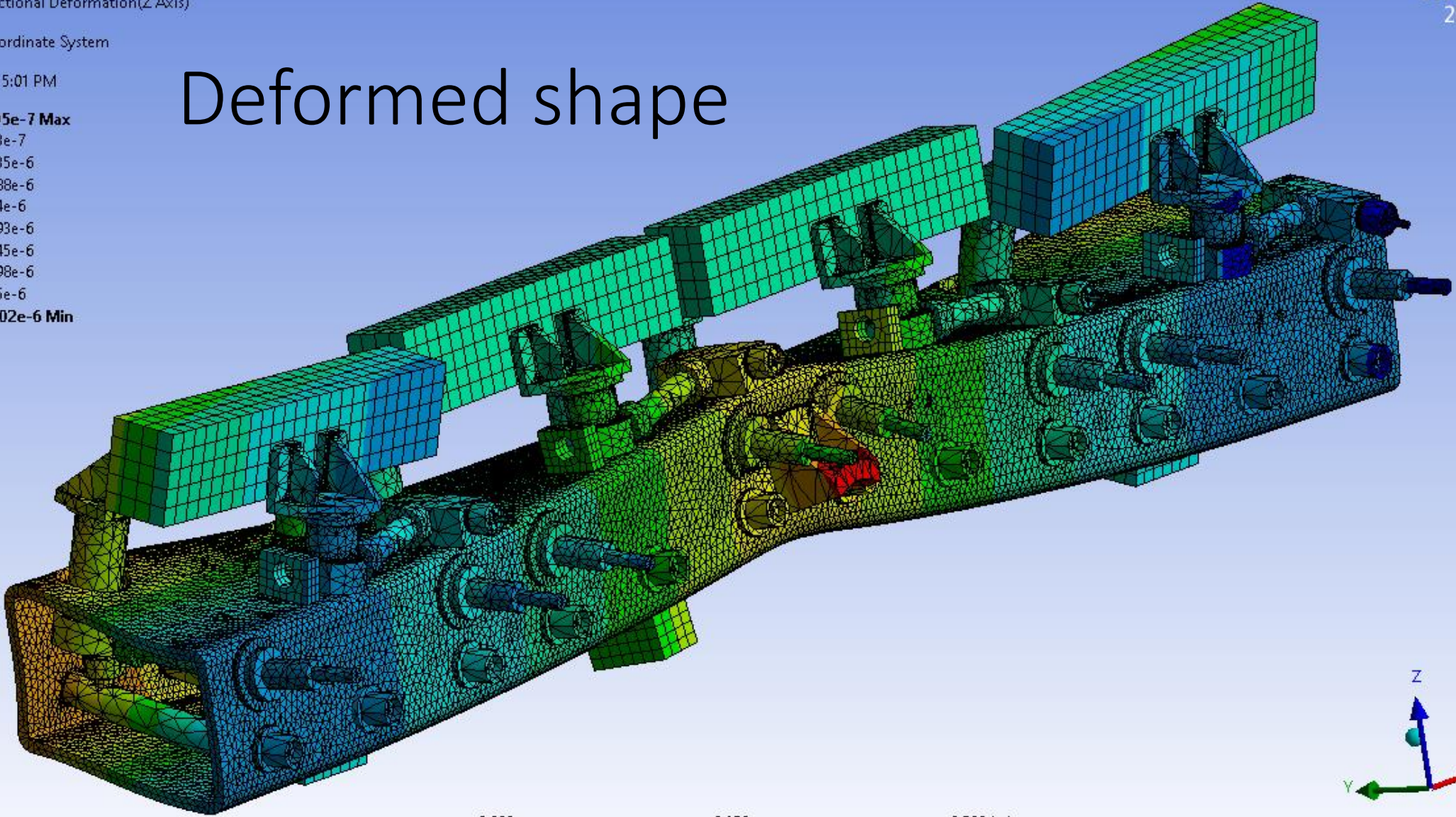
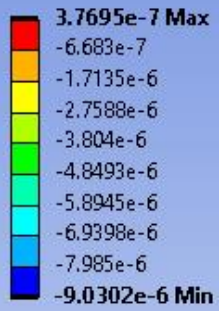


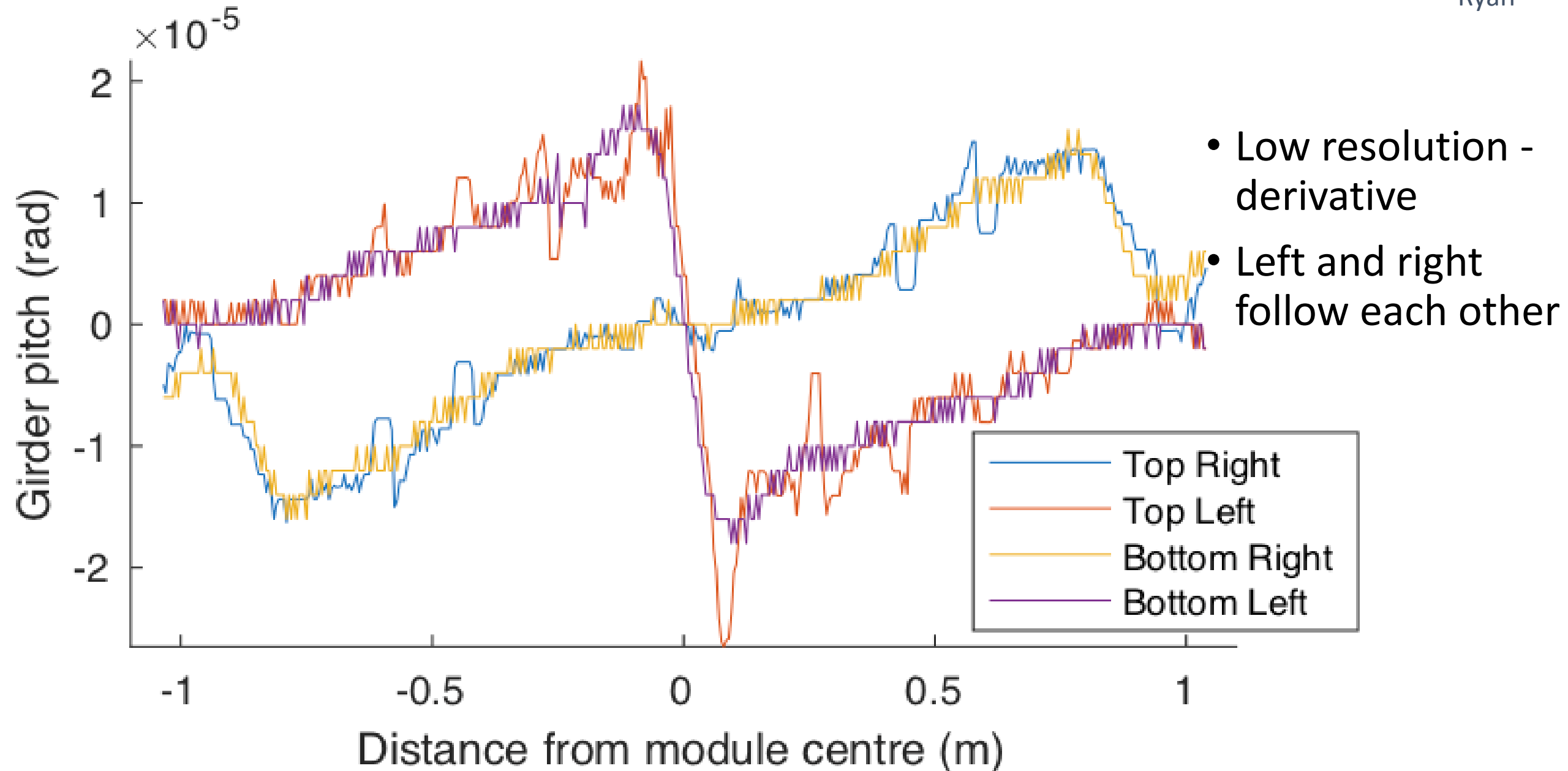
Motivation for Alignment

- Luminosity
- Pre-alignment systems (6 axis on each super-structure)

Deformed shape

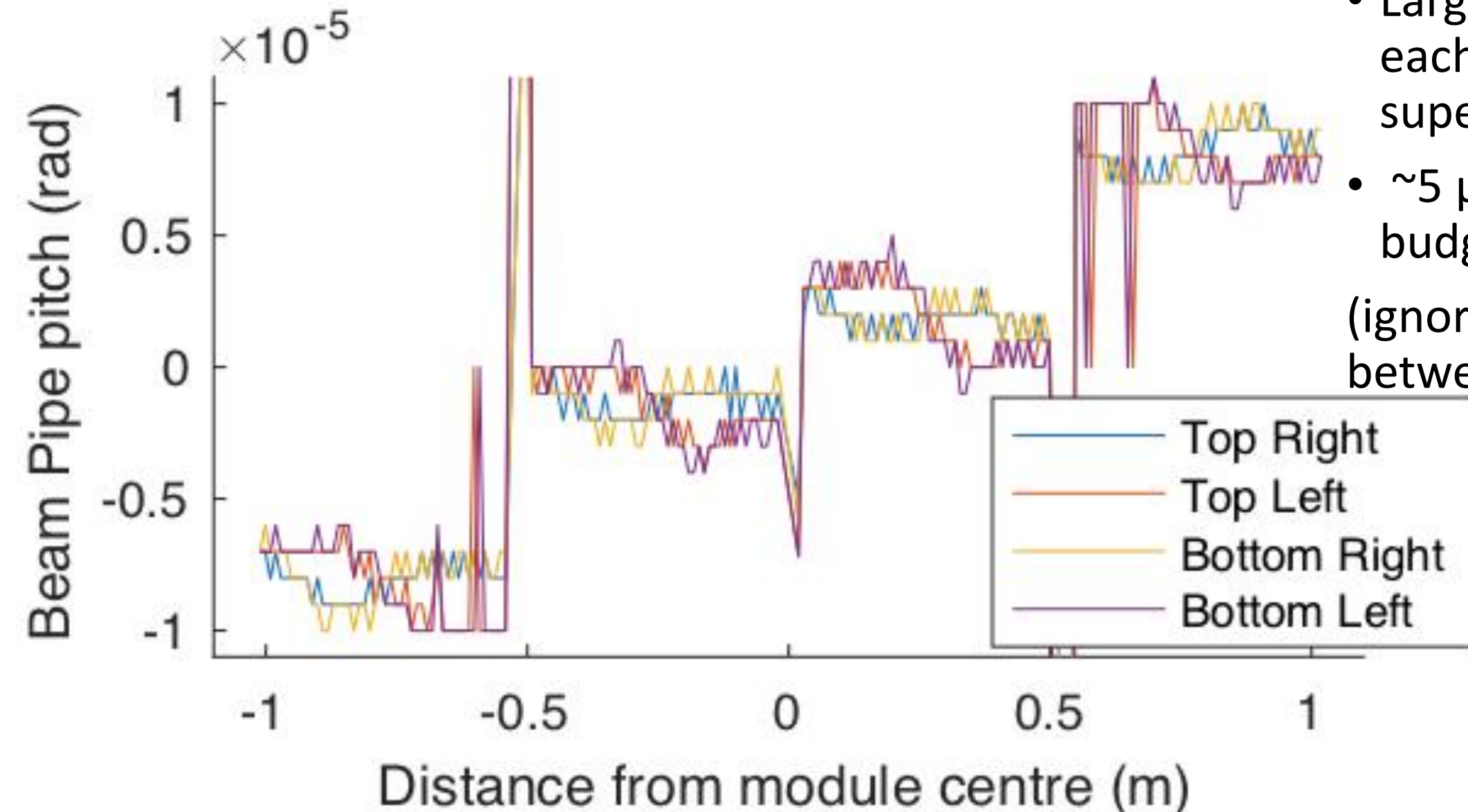
A: Static Structural
Directional Deformation
Type: Directional Deformation(Z Axis)
Unit: m
Global Coordinate System
Time: 1
7/12/2022 5:01 PM



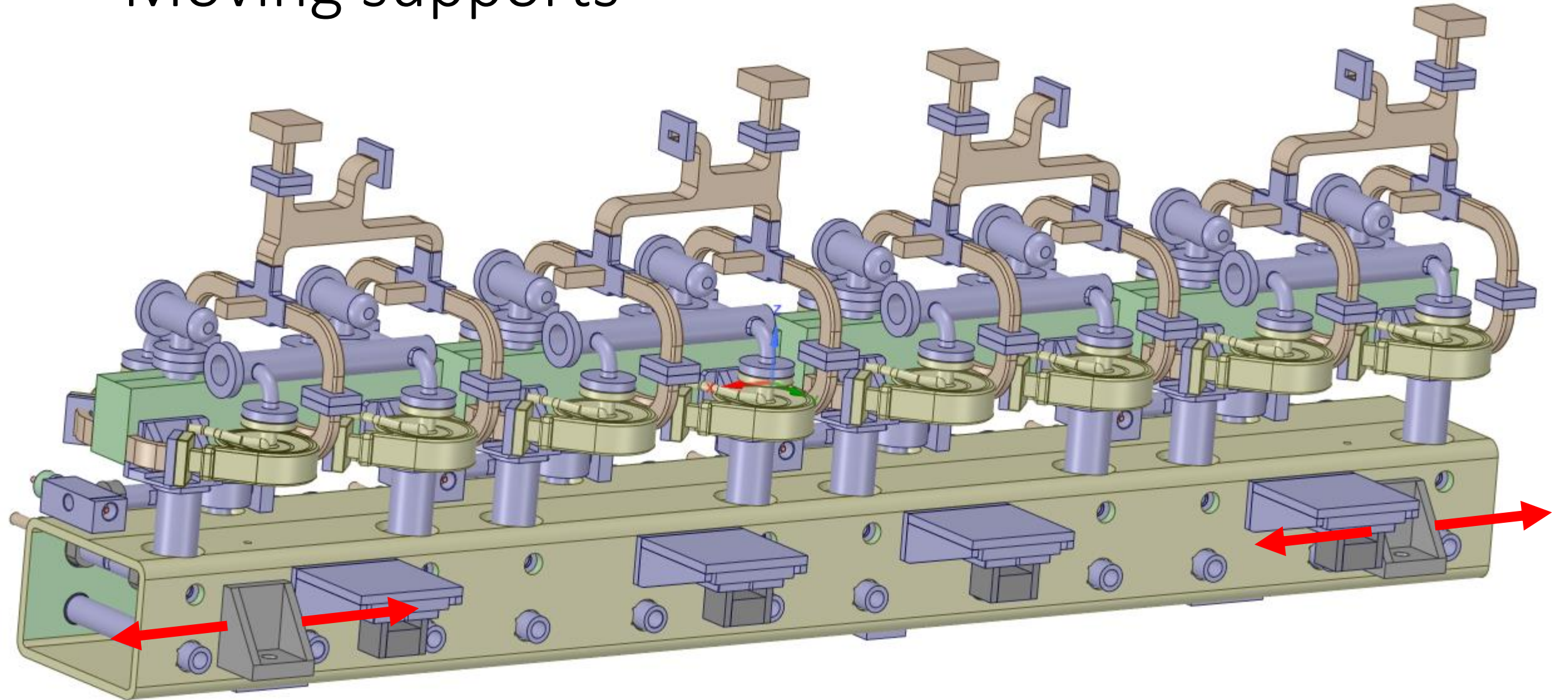


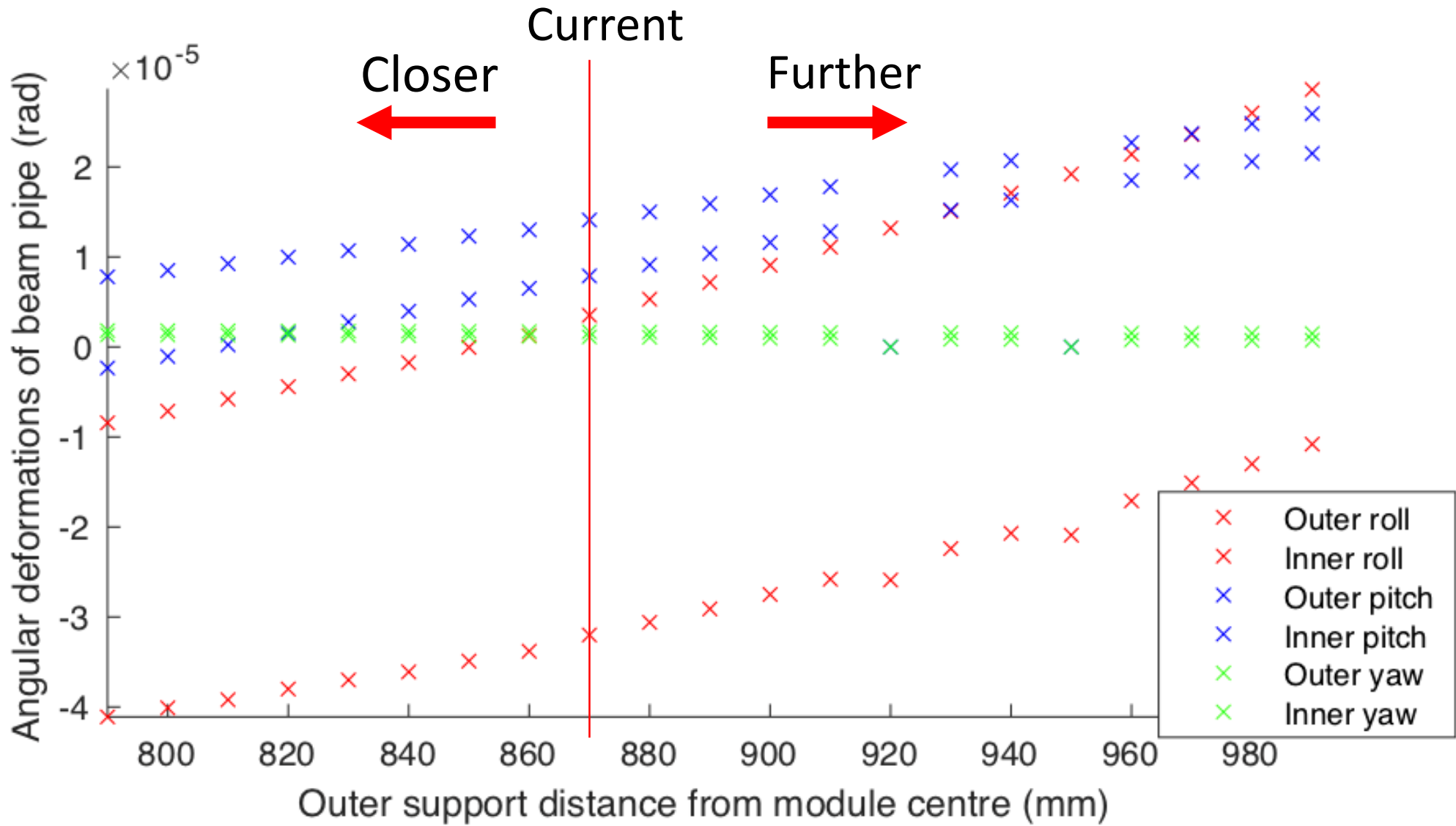
- Large variation in each superstructure
- $\sim 5 \mu\text{rad} > 1 \mu\text{rad}$ budget

(ignore peaks between segments)



Moving supports



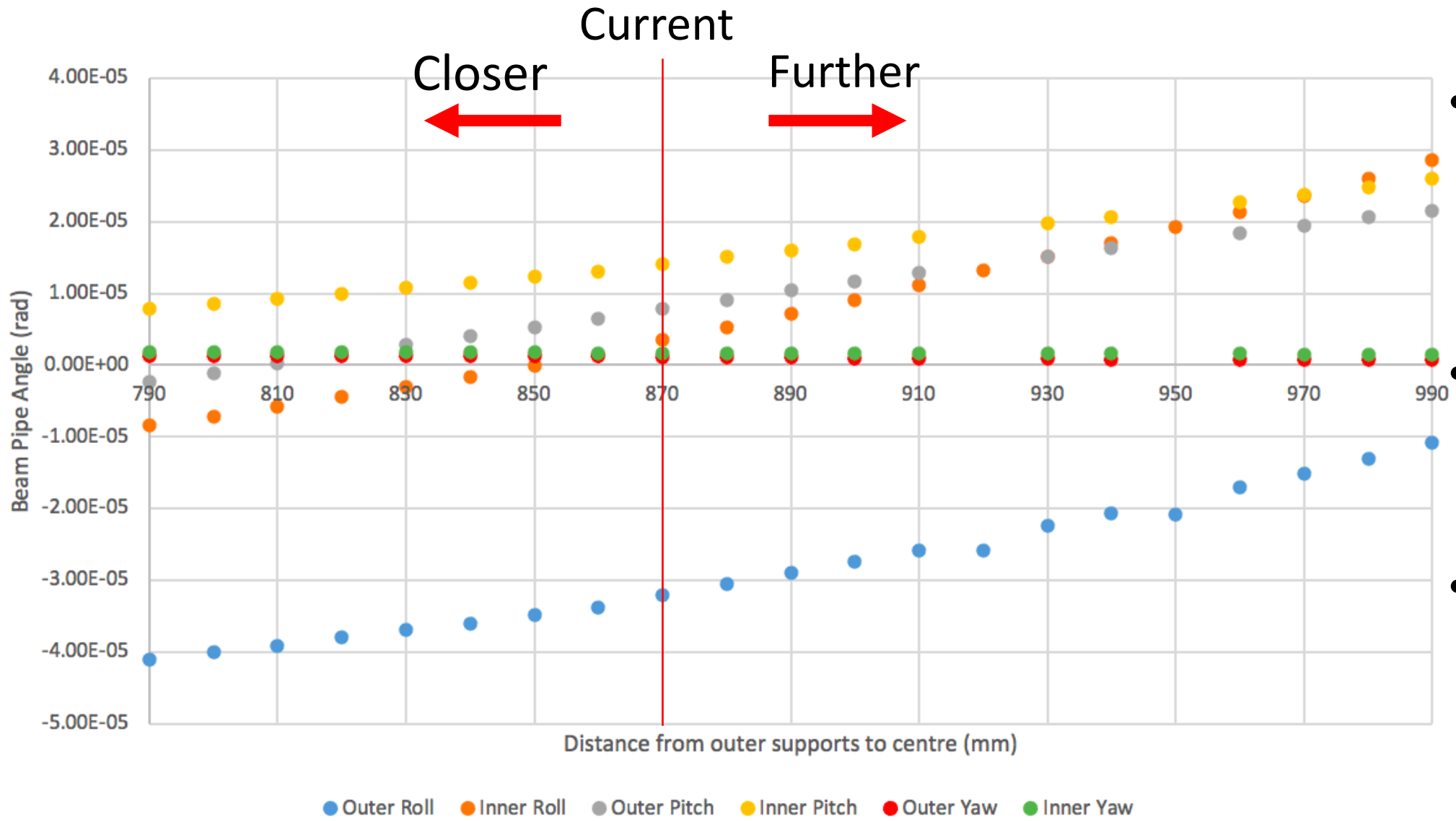


- Trade-off between pitch and roll

- Yaw remains small

- Trade-off between active resolution and pre-range

~10% vs 50%

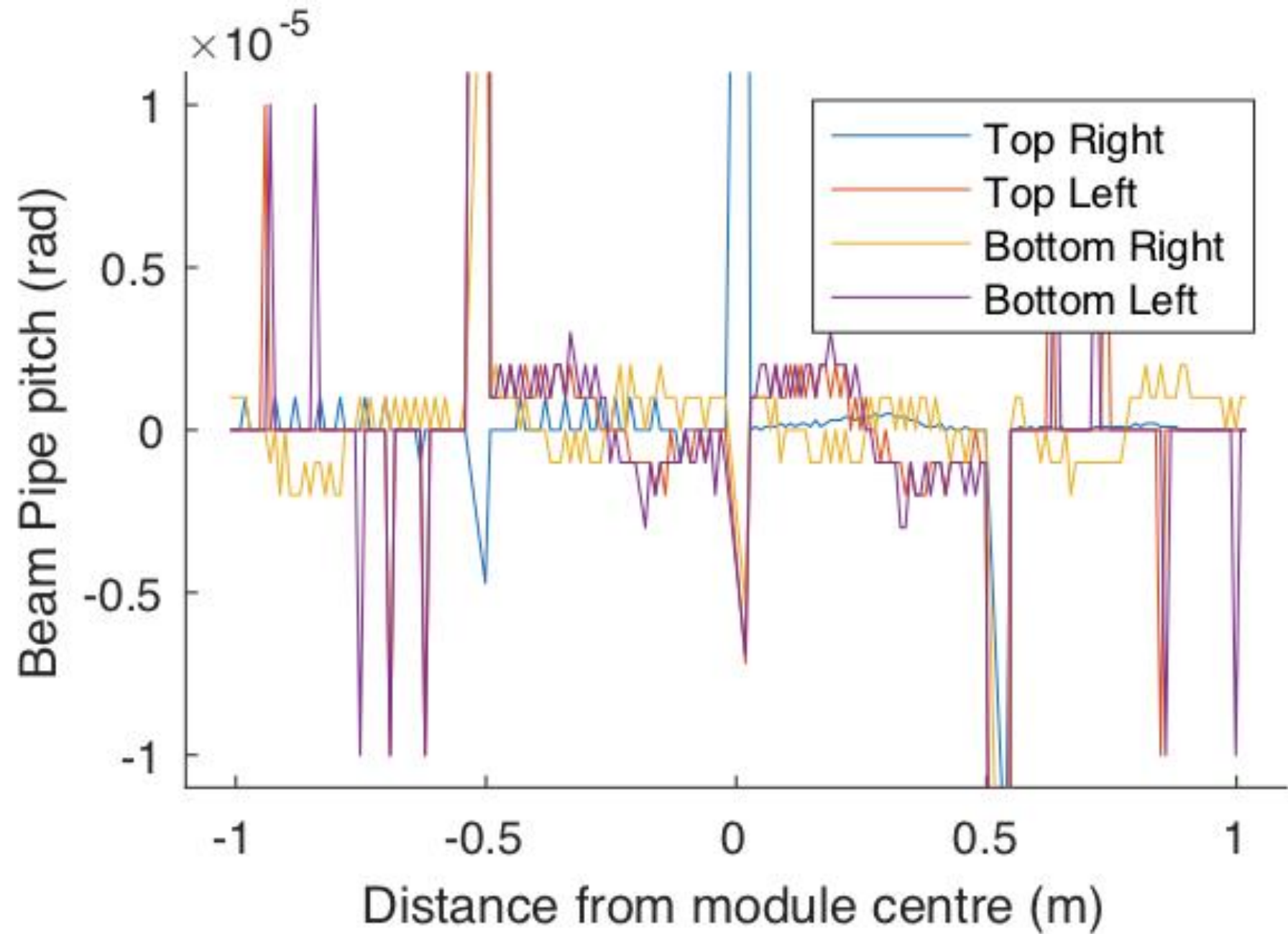


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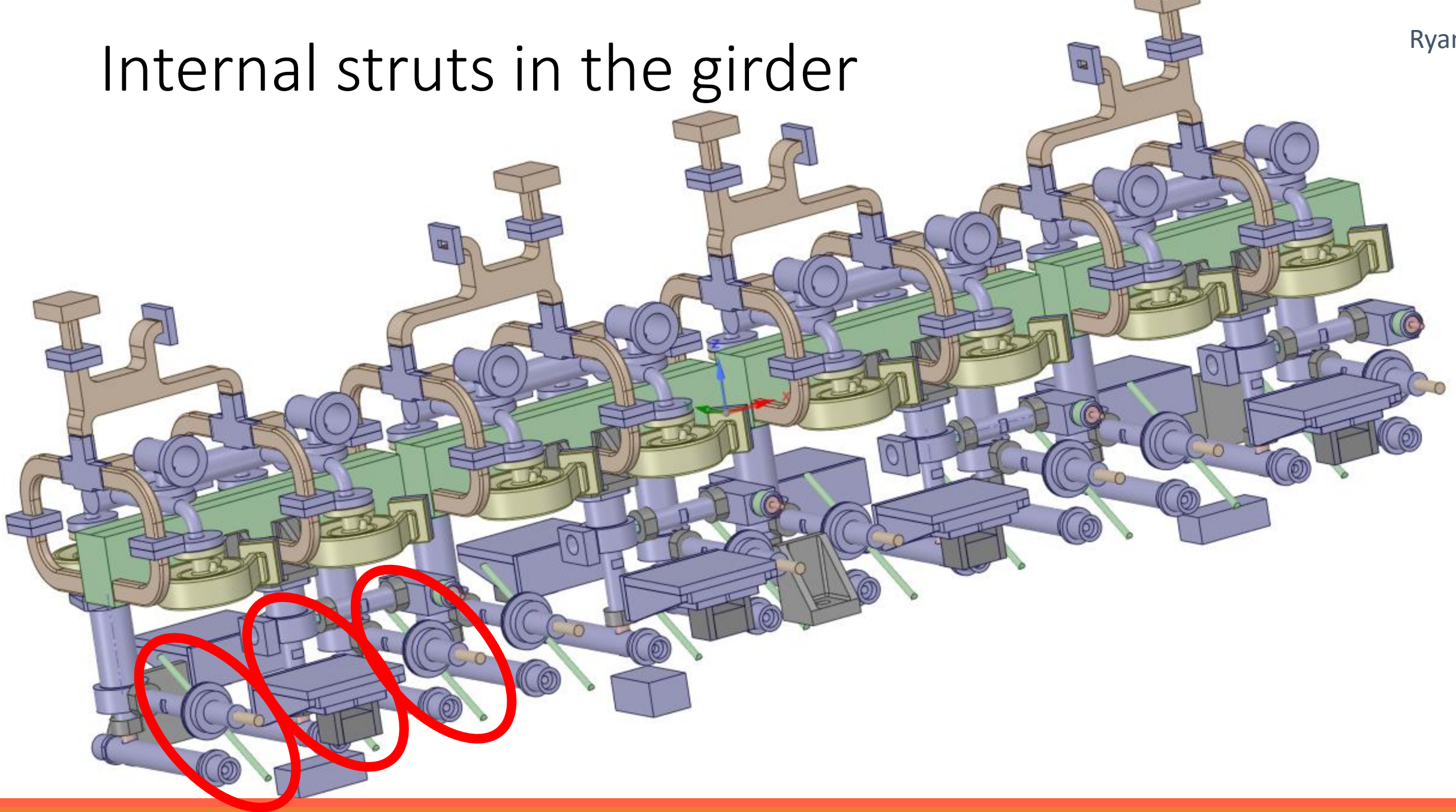
- Trade-off between active resolution and pre-range

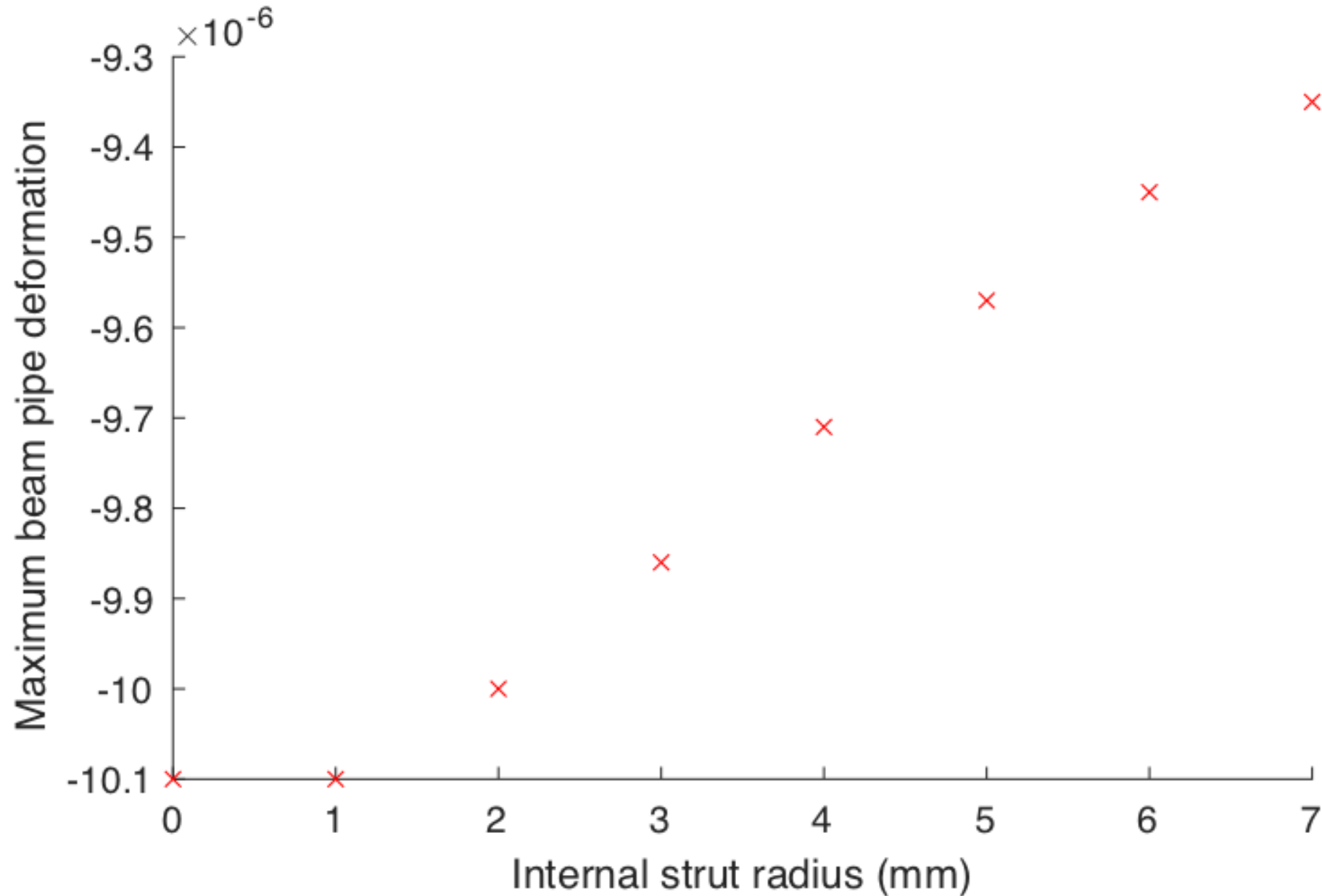
~10% vs 50%



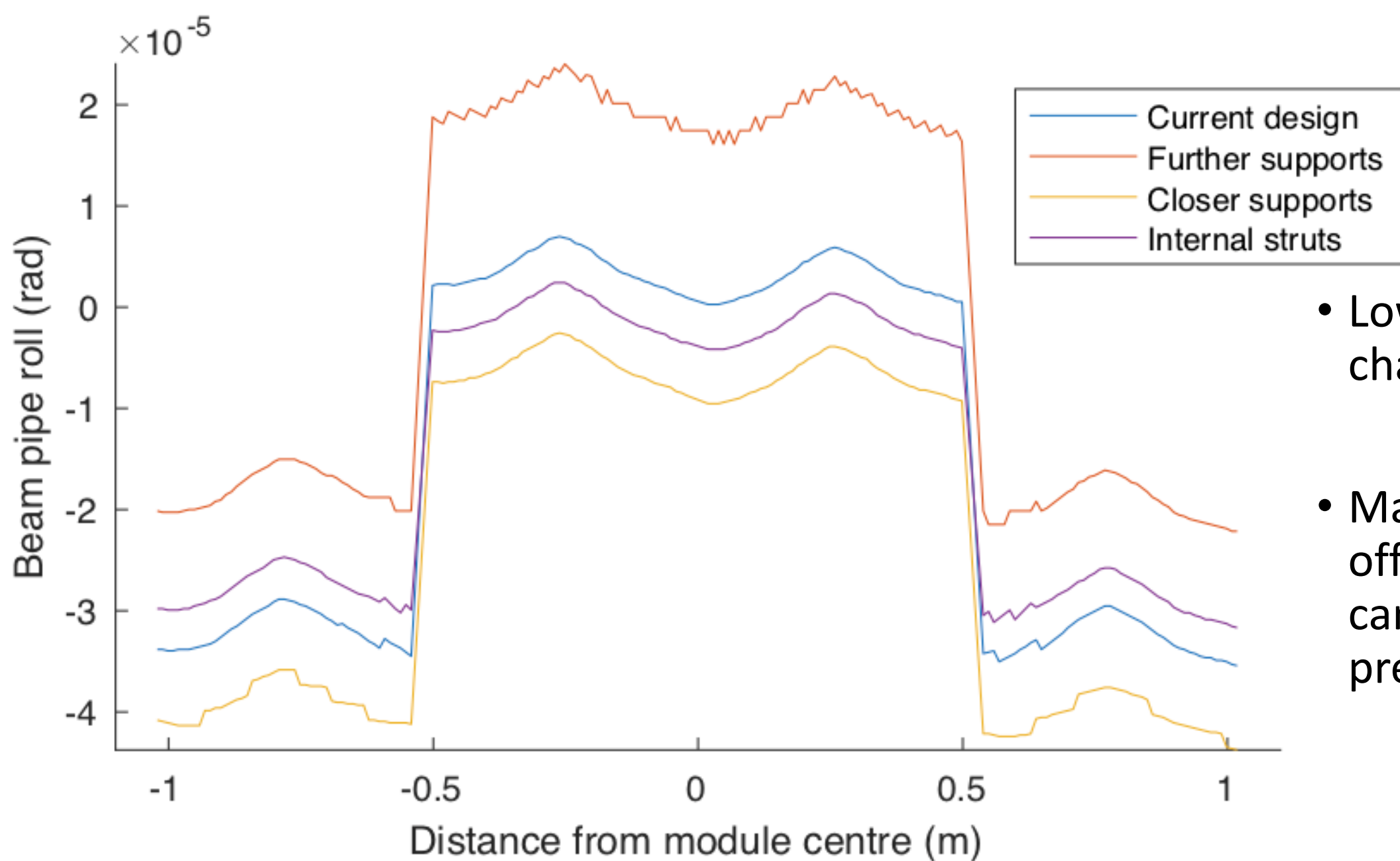
- Reduction just changing zero offset

Internal struts in the girder

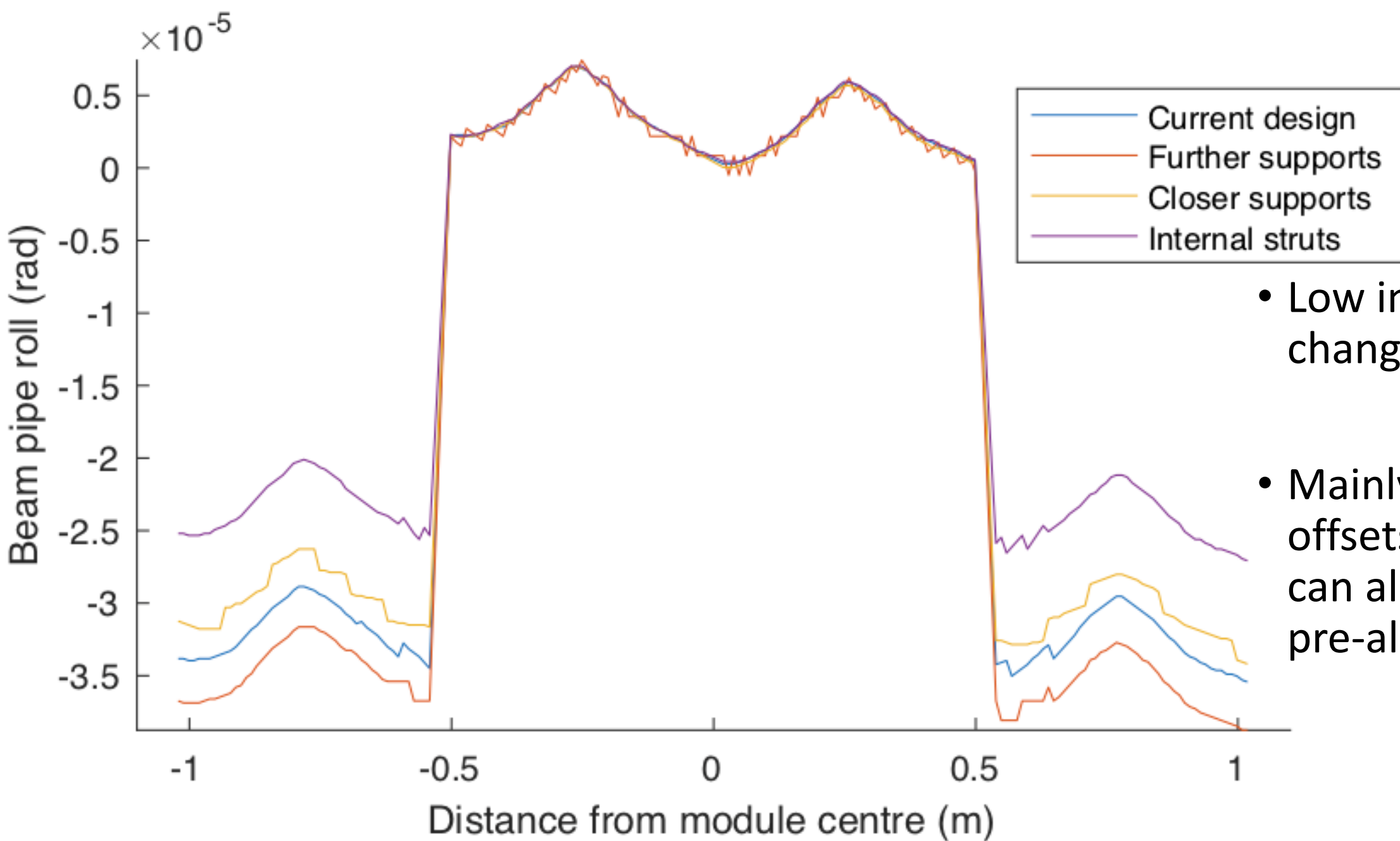




- Low impact on deformation
- Initially quadratic, then tapers - other modes



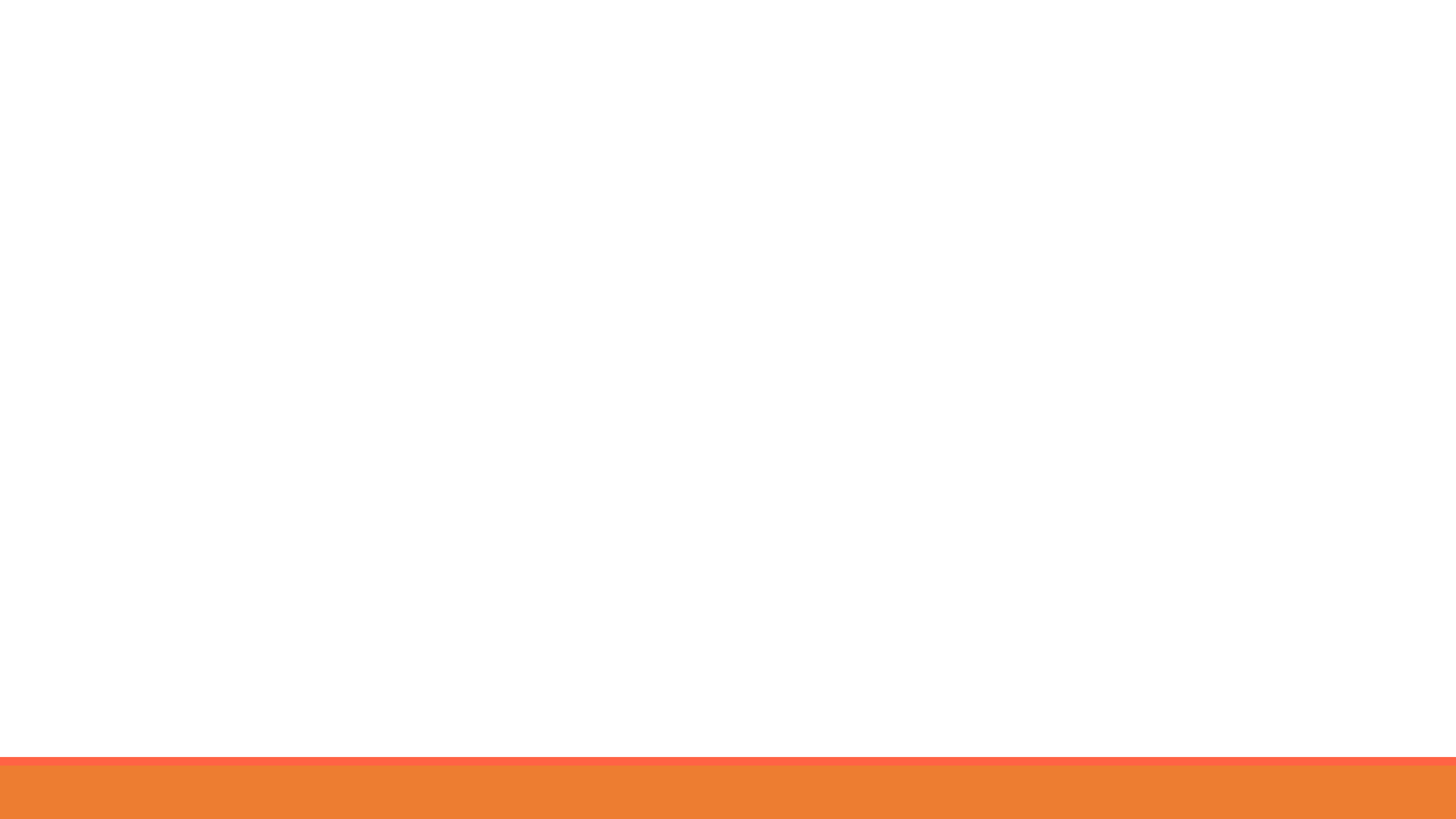
- Low impact of changes on roll
- Mainly affects offsets, which can already be pre-aligned out

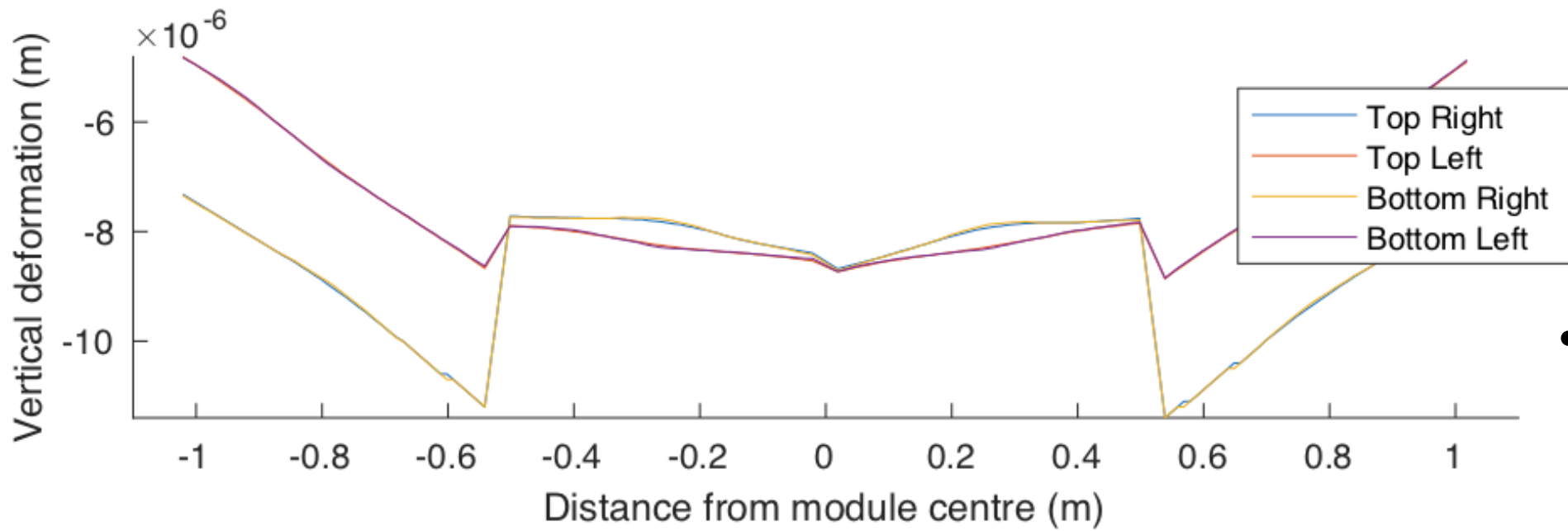


- Low impact of changes on roll
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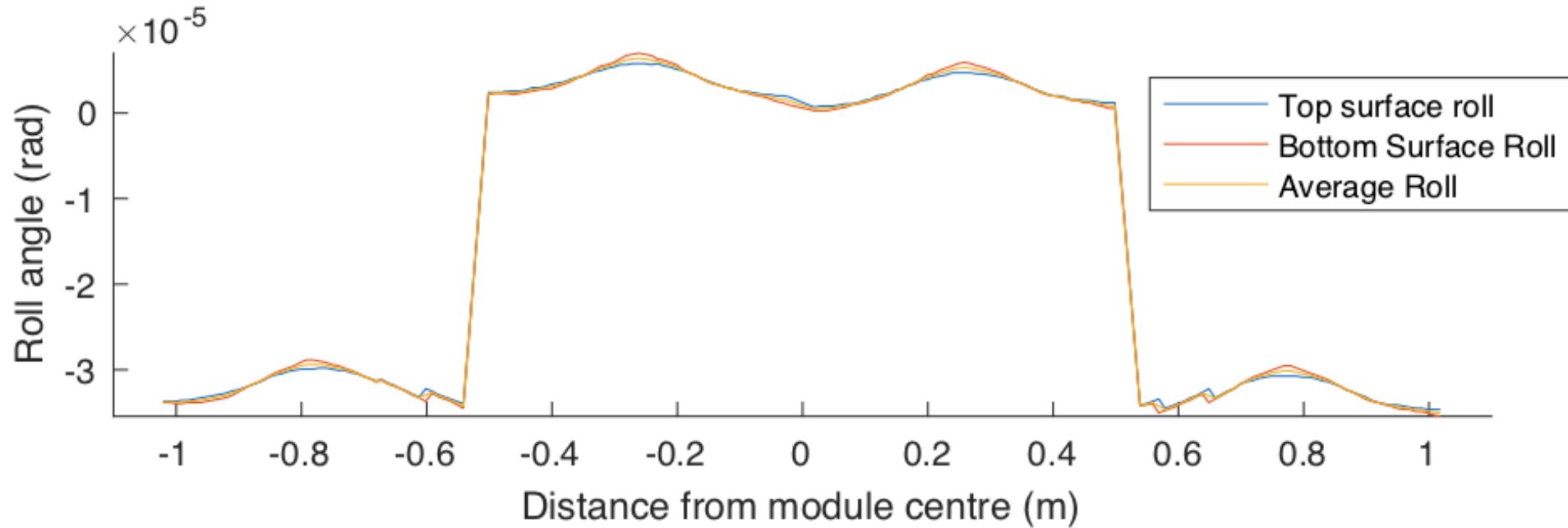
Conclusions

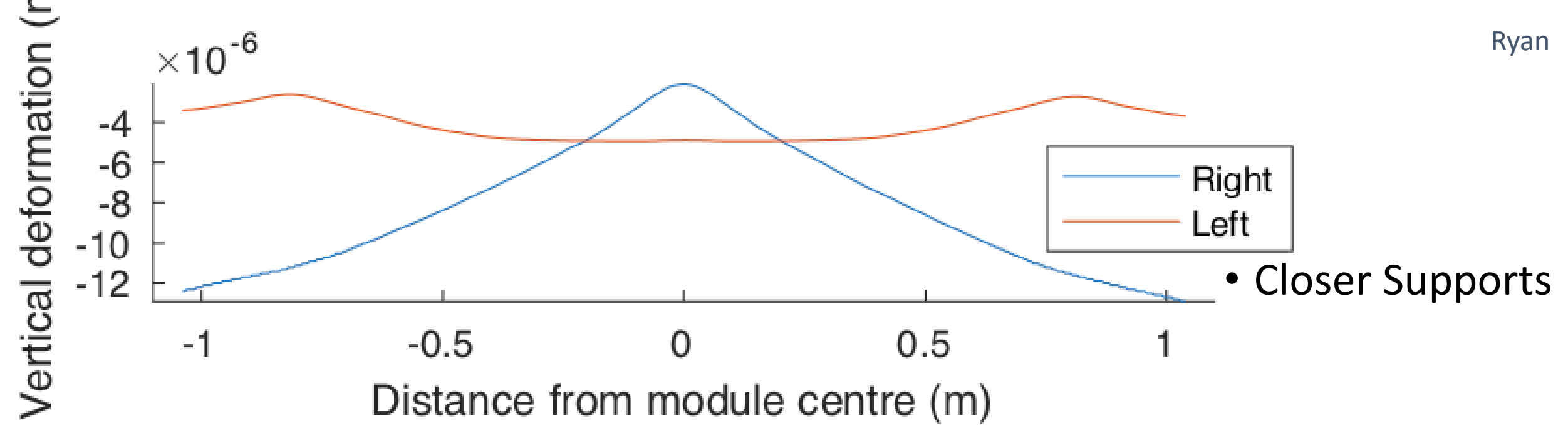
- Moving support locations or adding internal struts has little affect of beam pipe deformation and roll
- Pitch main concern, but method leaves unclear



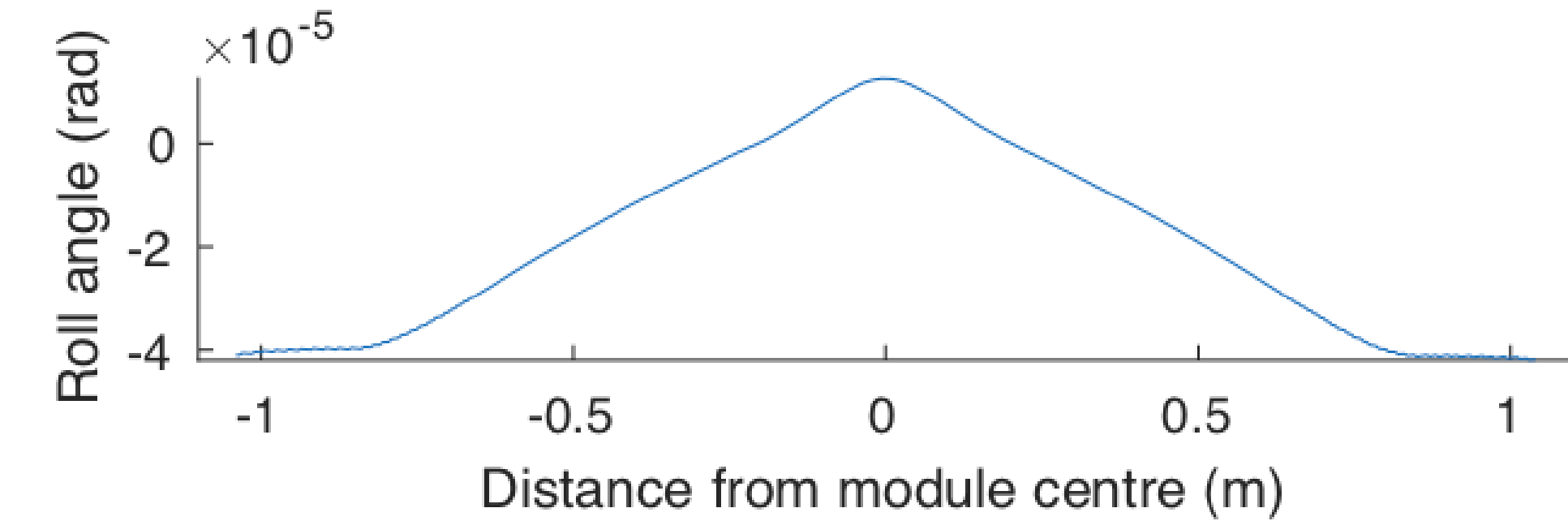


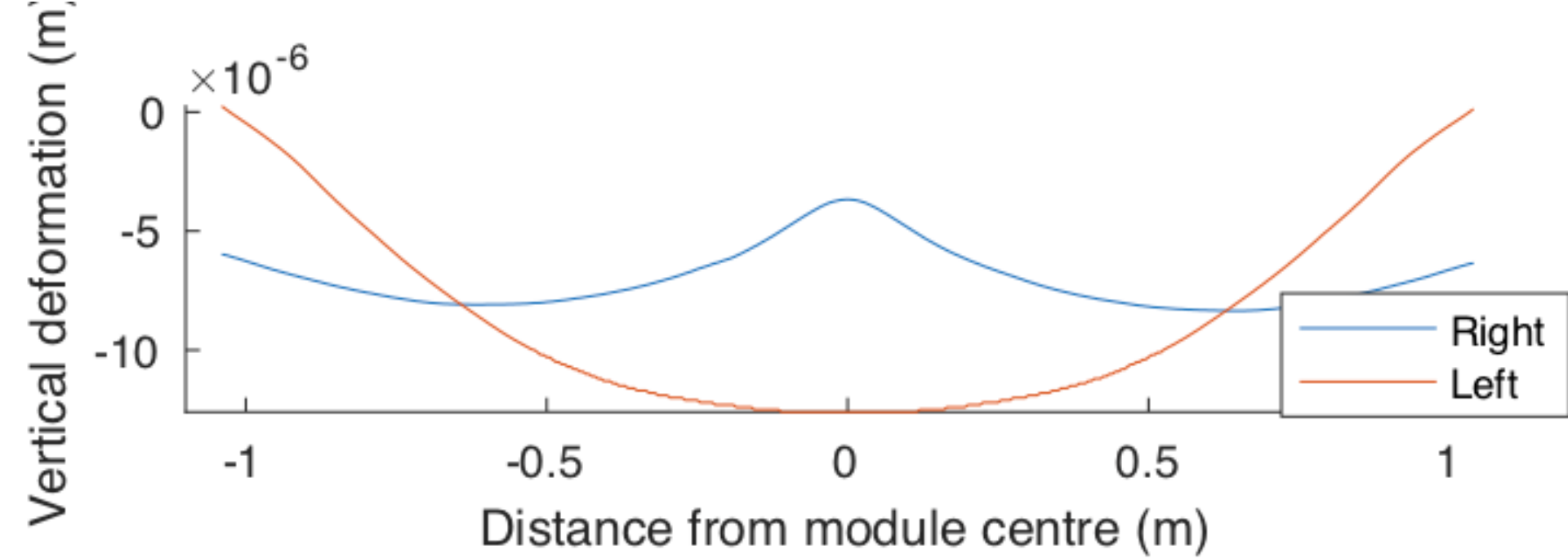
- Current design



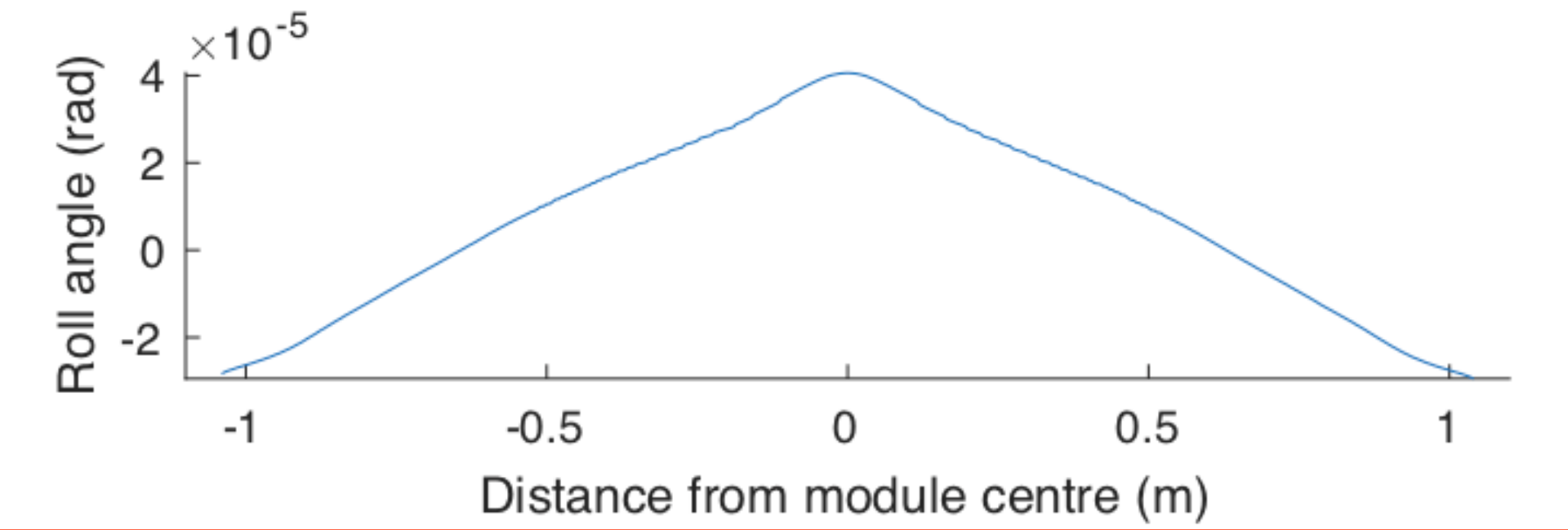


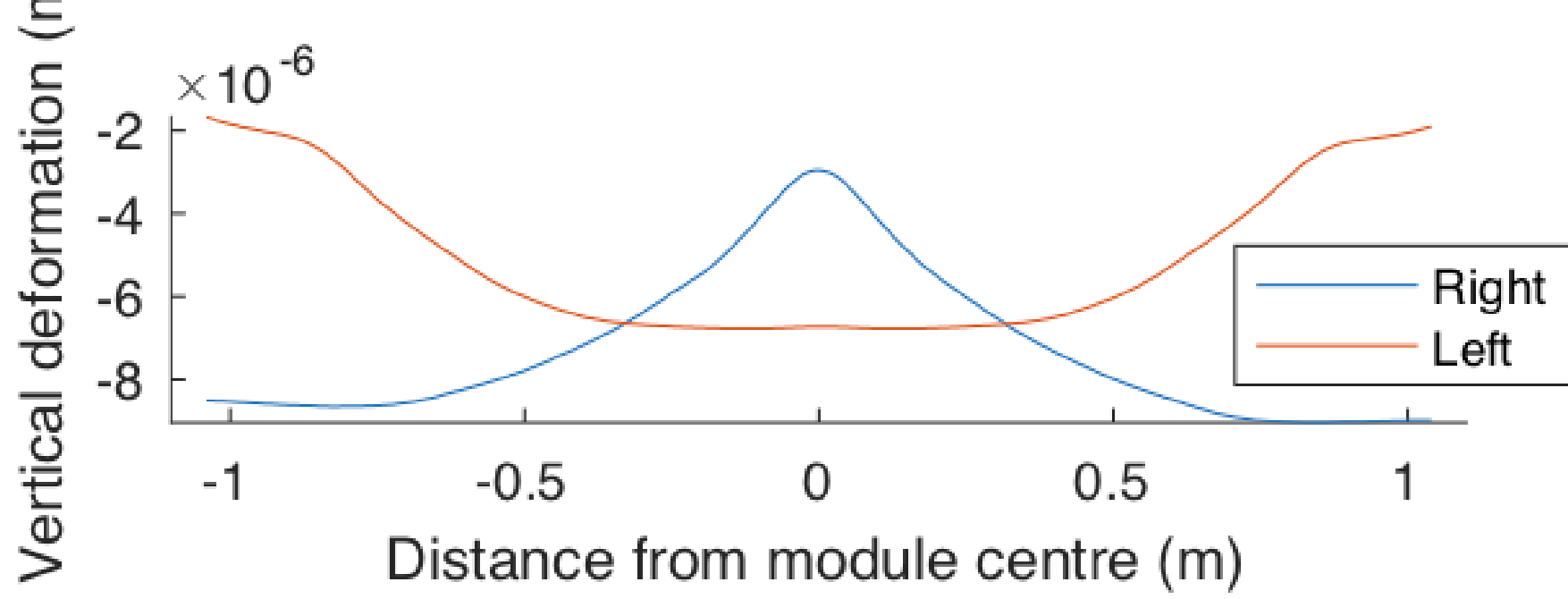
• Closer Supports





- Further Supports





- Internal struts

