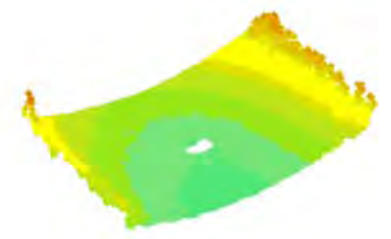
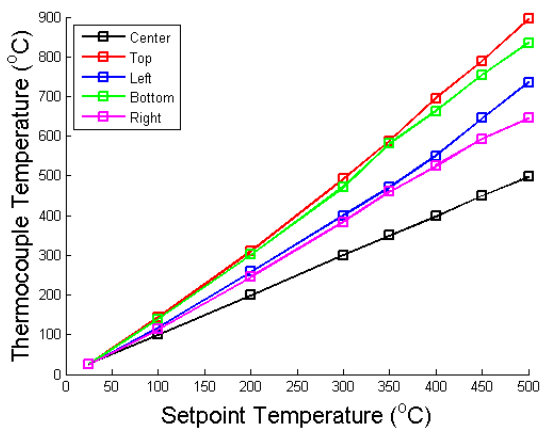
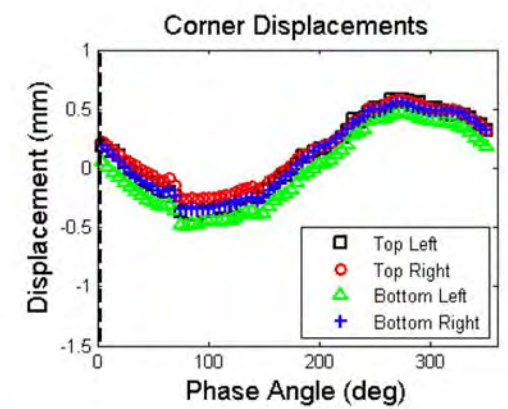
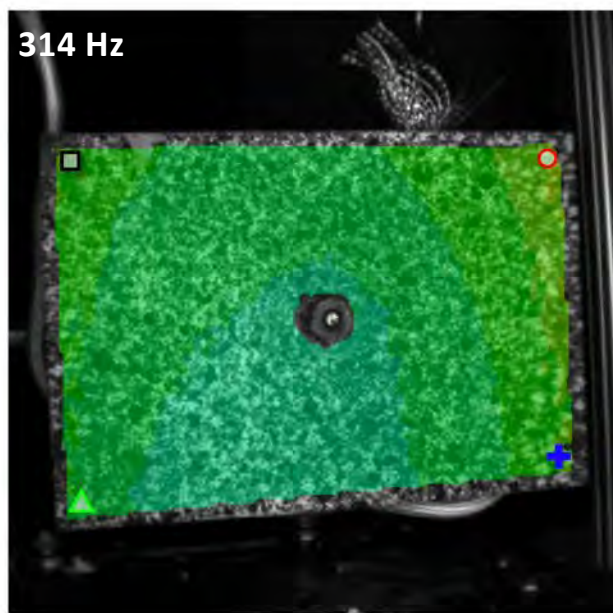
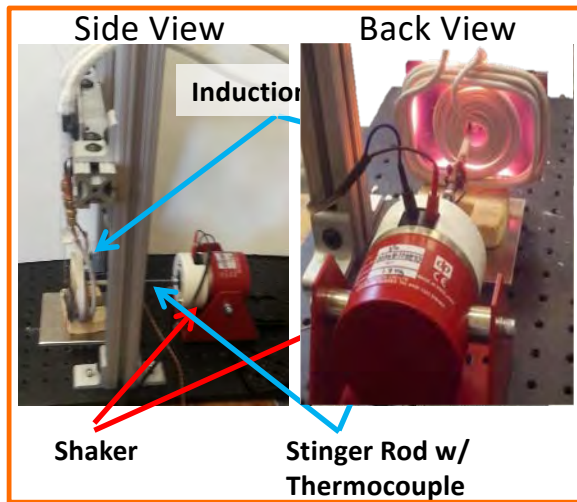
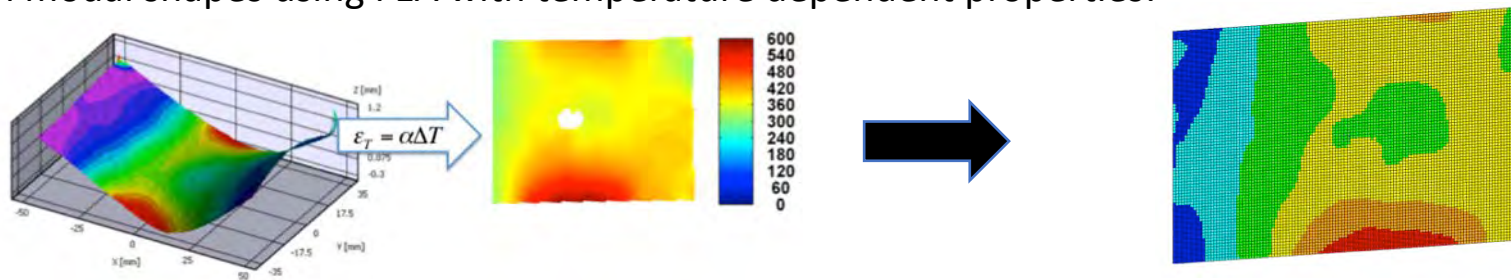


# Thermoacoustic setup



# Thermoacoustic simulations

- Obtain modal shapes using FEA with temperature dependent properties:



Rigid Tilt



104/107 Hz

Rigid Tilt



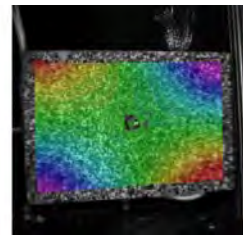
140/139 Hz

Bending



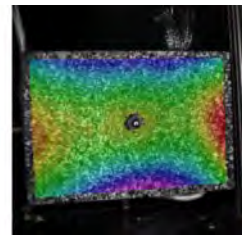
314/273 Hz

Torsion



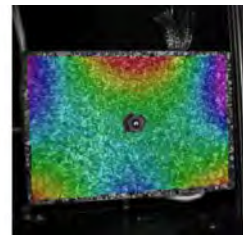
385/295 Hz

Saddle

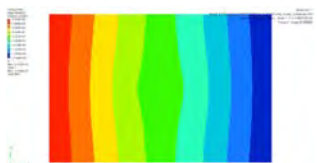


747/665 Hz

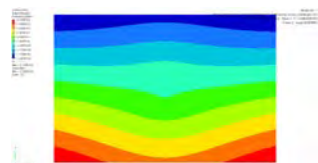
Higher order



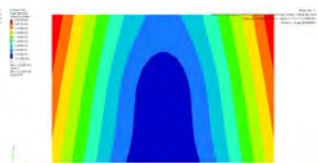
879/690 Hz



215/204 Hz



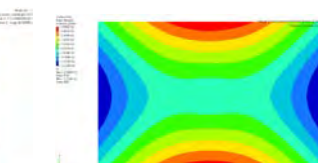
325/309 Hz



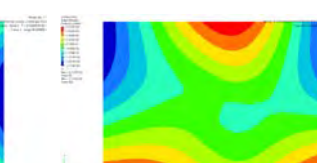
328/312 Hz



484/461 Hz



859/824 Hz



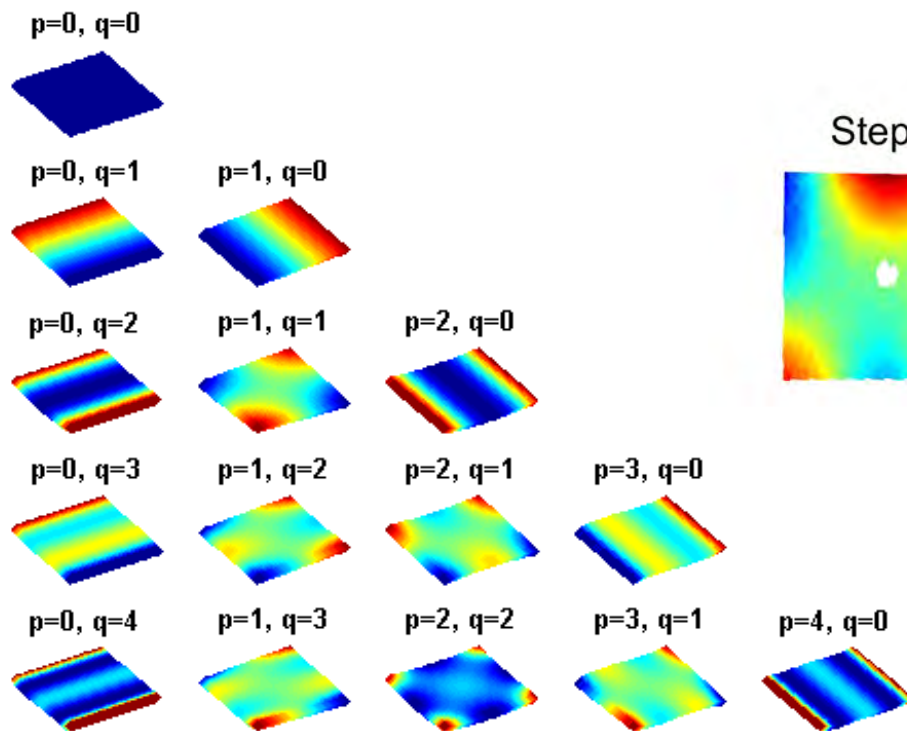
1216/1160 Hz



# Validation

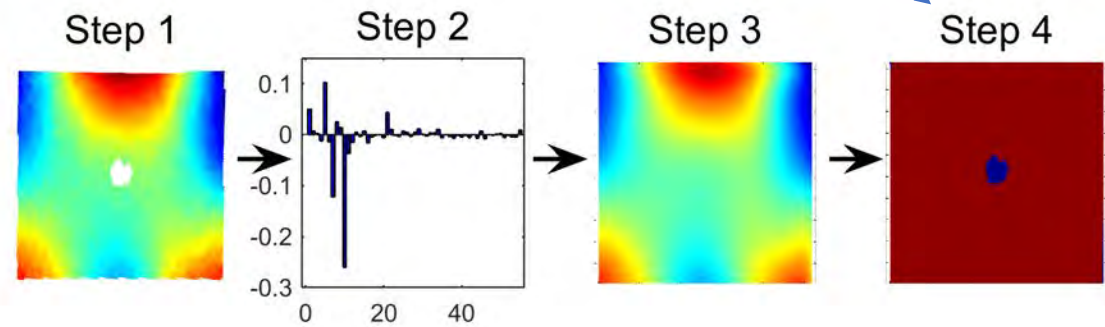
- Use Image Decomposition for validation:

## Chebyshev Polynomial Kernels:



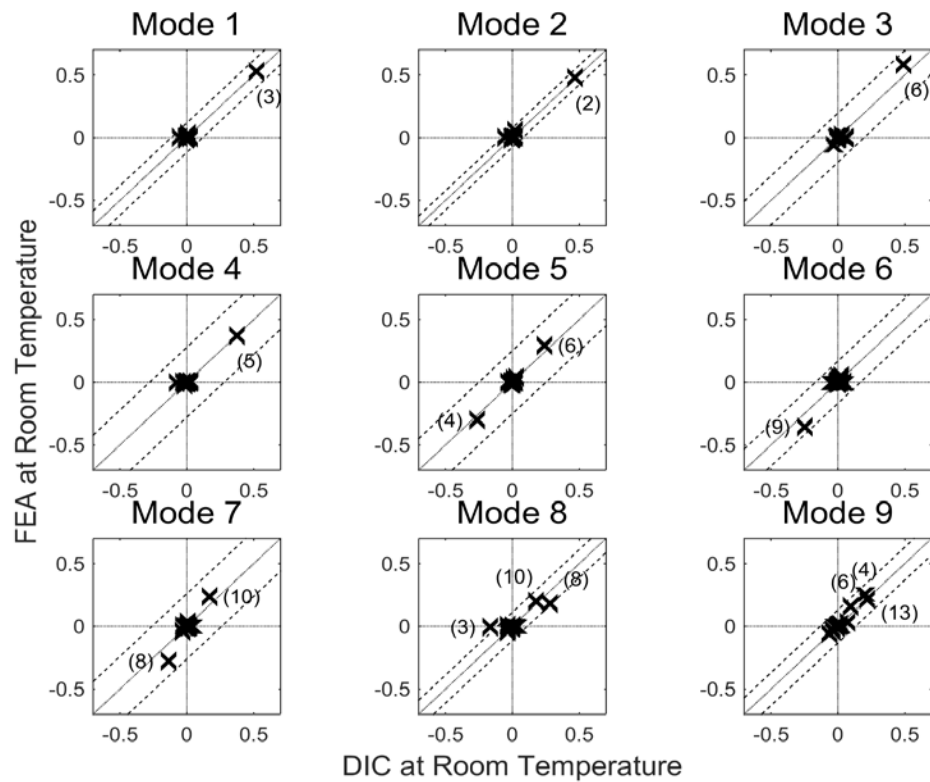
**Residual:**

$$u_{resid}^2 = \frac{1}{N} \sum_{i,j} (\hat{I}(i,j) - I(i,i))^2$$

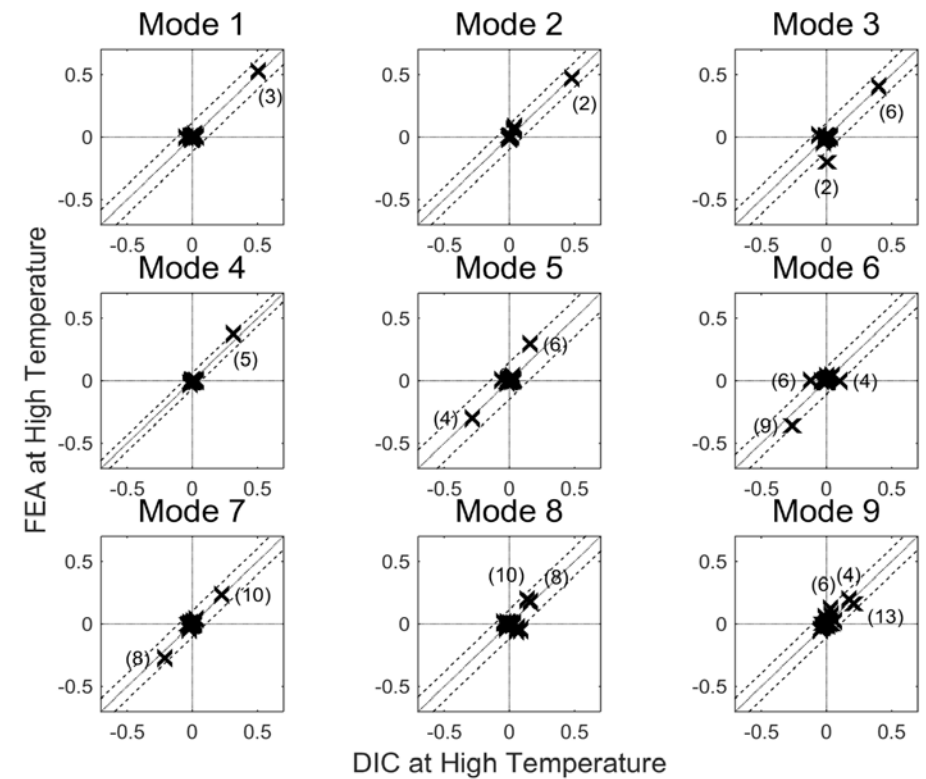


# Validation

- FEA-DIC room temperature:



- FEA-DIC high temperature:

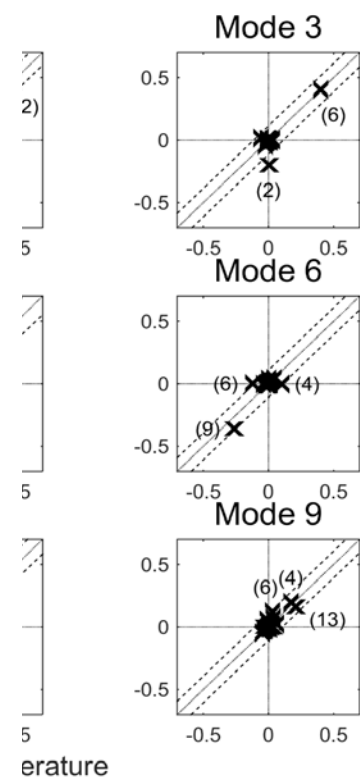
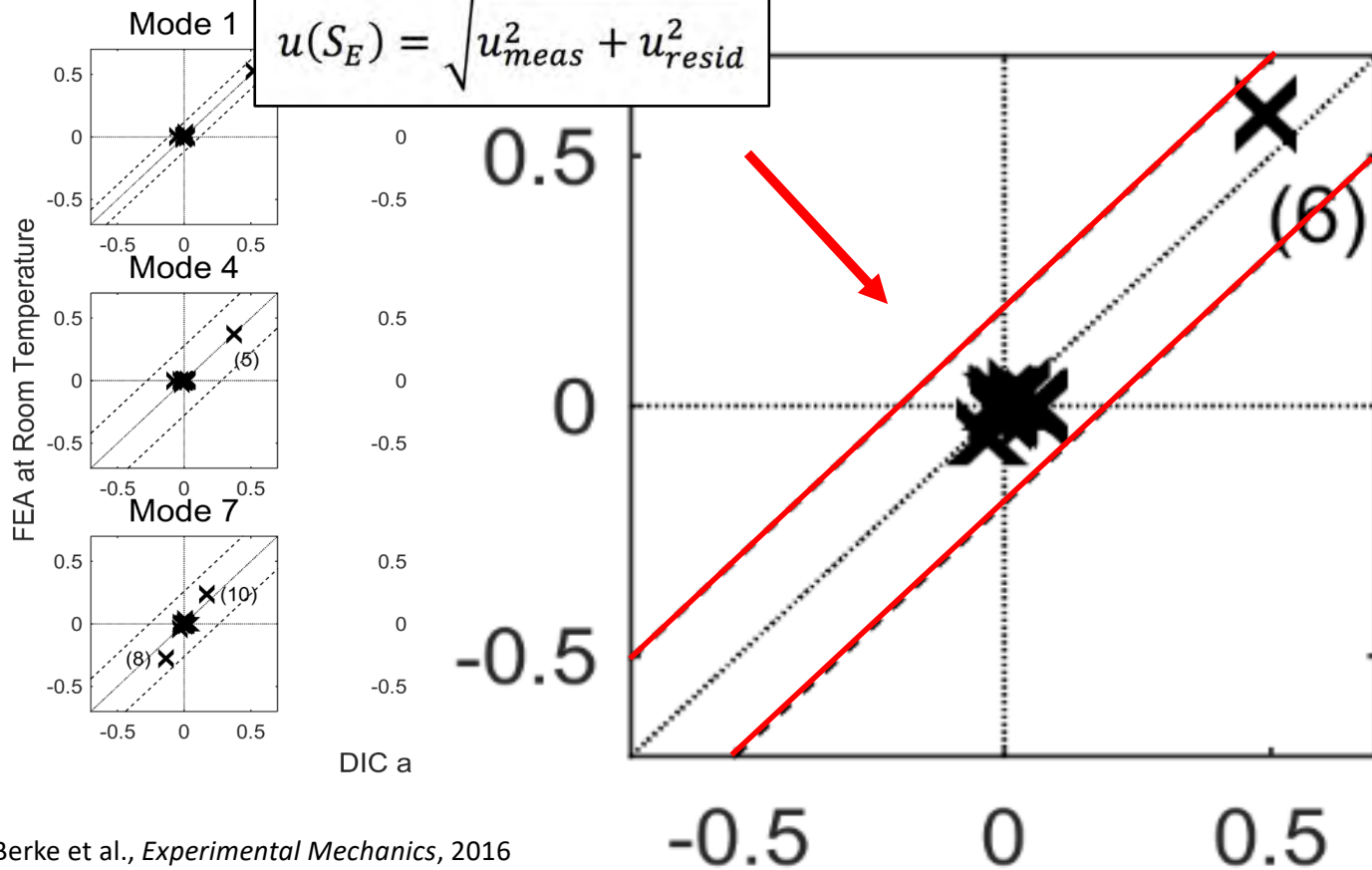


# Validation

- FEA-DIC room temper

$$u(S_E) = \sqrt{u_{meas}^2 + u_{resid}^2}$$

## Mode 3



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