

# Analysis of a Resonant Pyrex wedge Excited by a PZT Strip by Means of Finite Element Analysis (FEA)

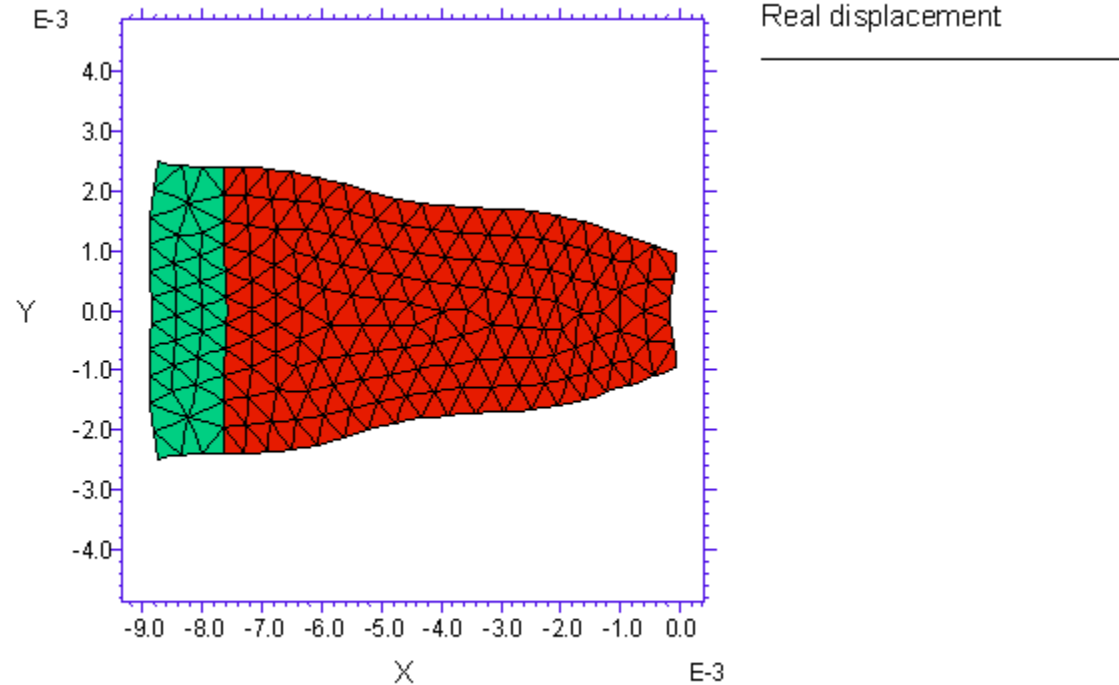
using

flexPDE

Craig E. Nelson - Consultant Engineer

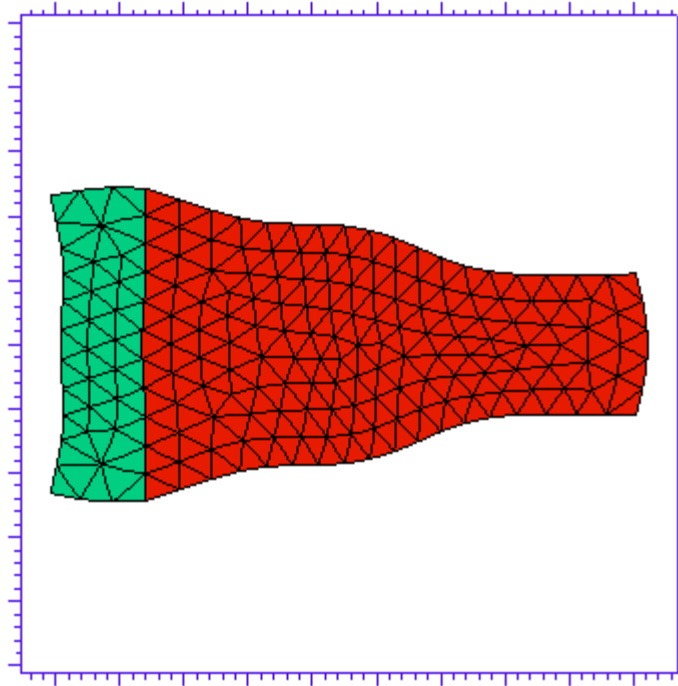
## Maximum and Minimum face Displacement

Back End PZT Strip Excitation of a Wedge Shaped Pyrex Front Piezo 18:52:07 1/14/100  
FlexPDE 2.15a



LONGVIBWEDGE02: Grid#1 p2 Nodes=719 Cells=330 RMS Err= 1.2e-4  
Stage 5 omega= 5164747. mu= 0.33 freq= 821995.0

Maximum Negative Face Displacement

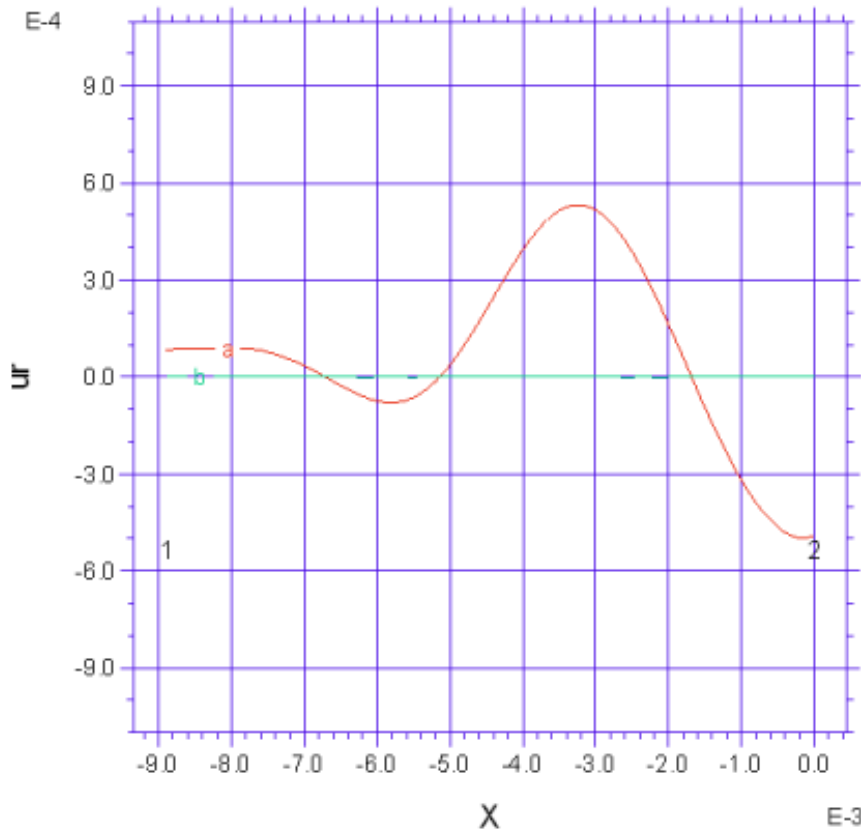


x

Maximum Positive Face Displacement

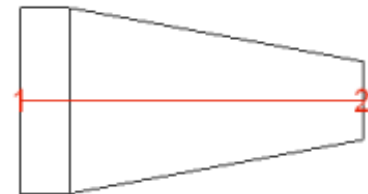
Back End PZT Strip Excitation of a Wedge Shaped Pyrex Front Piece

13:52:07 1/14/100  
FlexPDE 2.15a



ELEVATION  
From (-8.89e-3, 0.0)  
To ( 0.0, 0.0)

a: ur  
b: vr

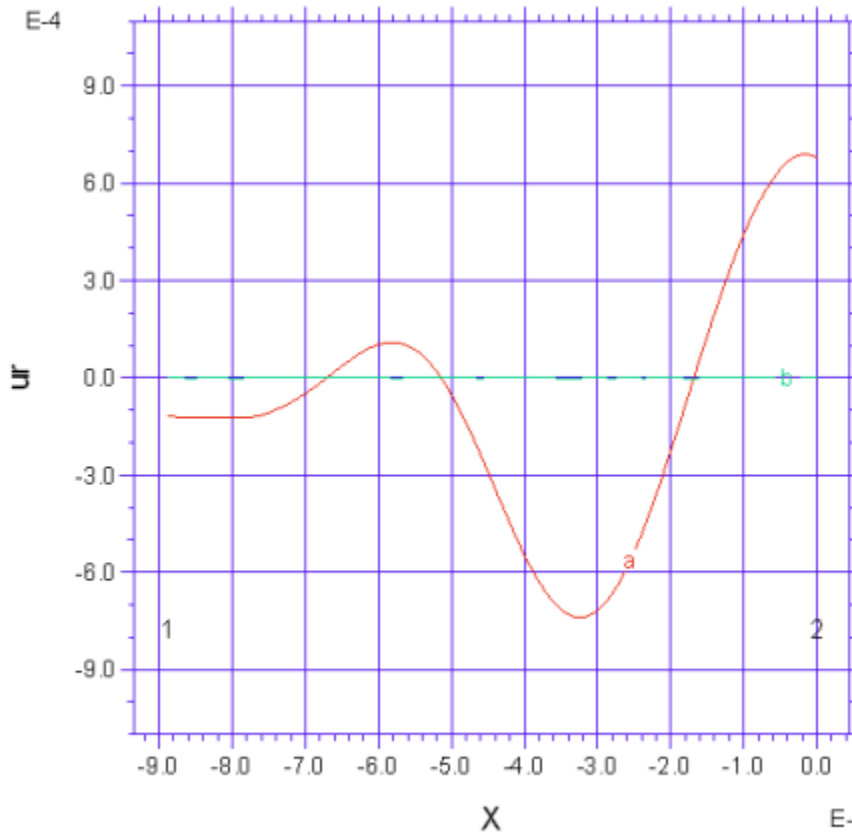


LONGVIBWEDGE02: Grid#1 p2 Nodes=719 Cells=330 RMS Err= 1.2e-4  
Stage 5

Maximum Negative Face Displacement

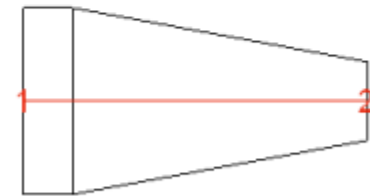
Back End PZT Strip Excitation of a Wedge Shaped Pyrex Front Piece

13:52:07 1/14/100  
FlexPDE 2.15a



ELEVATION  
From (-8.89e-3, 0.0)  
To ( 0.0, 0.0)

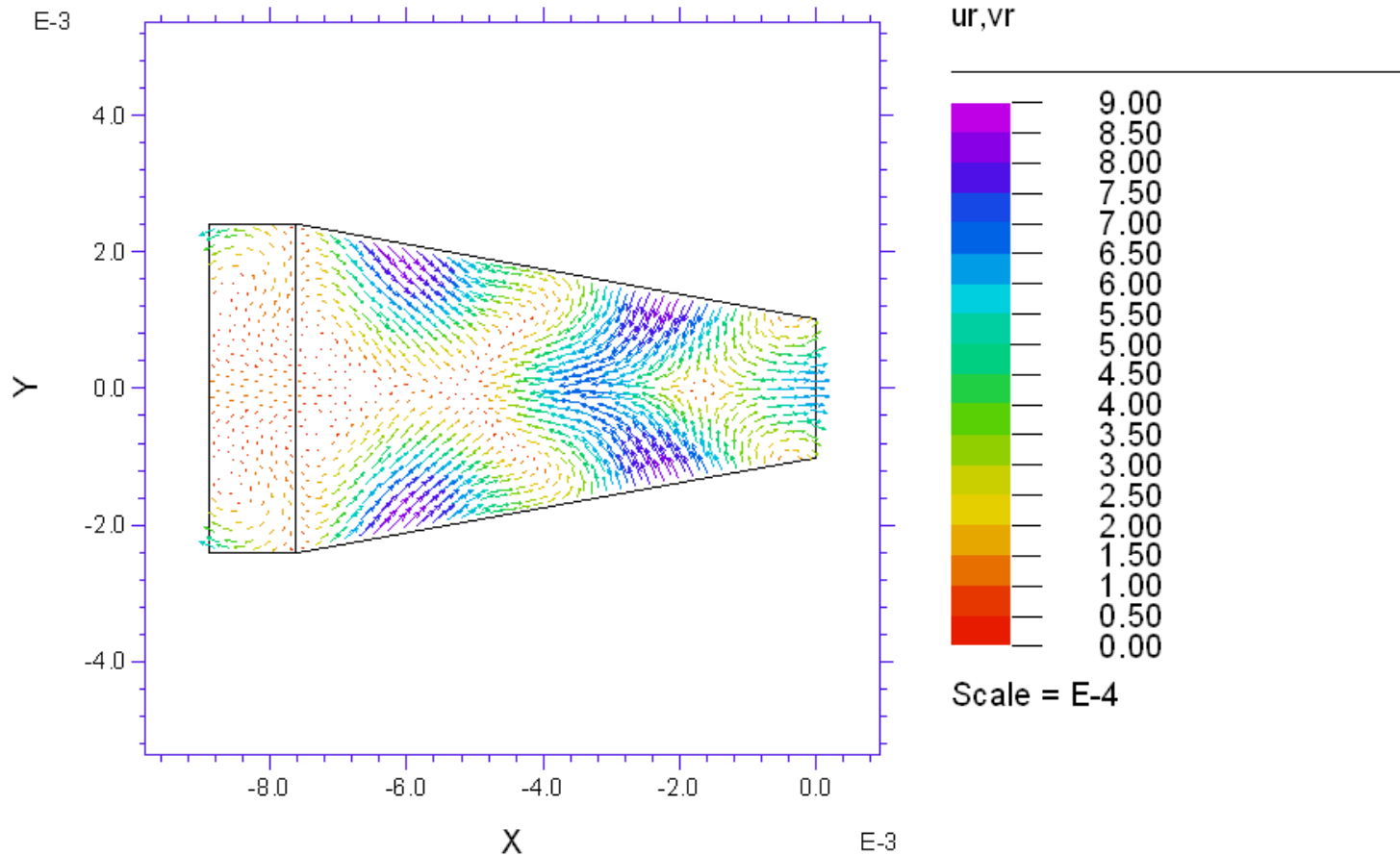
a: ur  
b: vr



LONGVIBWEDGE02: Grid#1 p2 Nodes=719 Cells=330 RMS Err= 1.2e-4  
Stage 4

Maximum Positive Face Displacement

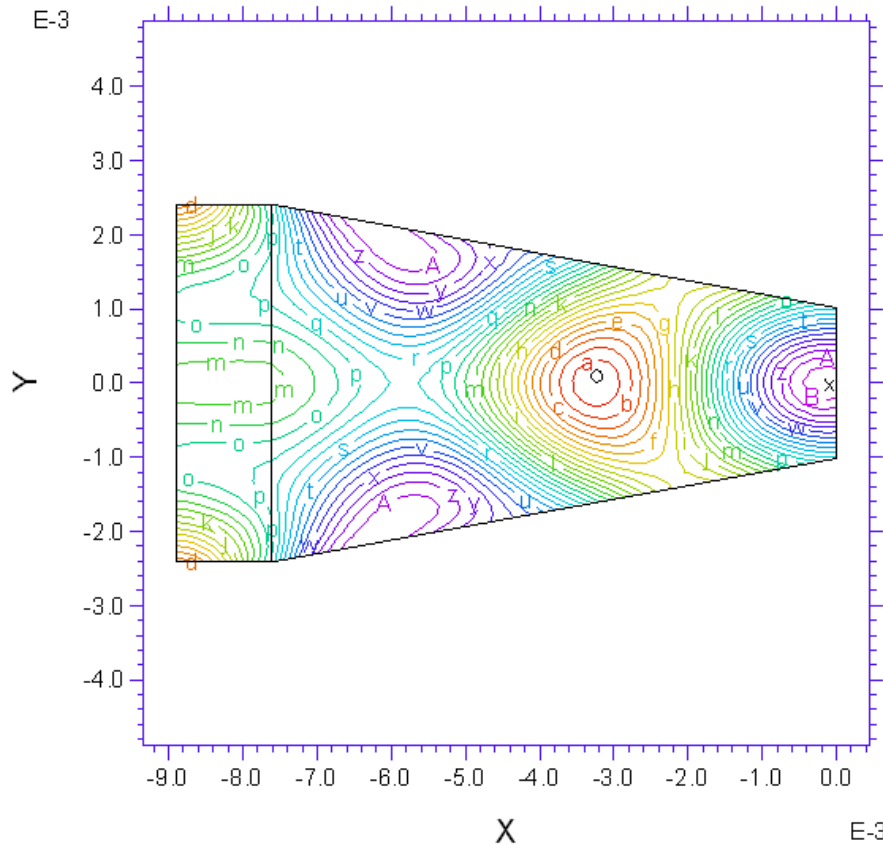
## Solid Body Displacement Plots



LONGVIBWEDGE02: Grid#1 p2 Nodes=719 Cells=330 RMS Err= 1.2e-4  
Stage 4

### Vector Plot of Solid Body Displacements





ur

|     |       |             |       |
|-----|-------|-------------|-------|
| max | 6.86  | g :         | -4.00 |
| B : | 6.50  | f :         | -4.50 |
| A : | 6.00  | e :         | -5.00 |
| z : | 5.50  | d :         | -5.50 |
| y : | 5.00  | c :         | -6.00 |
| x : | 4.50  | b :         | -6.50 |
| w : | 4.00  | a :         | -7.00 |
| v : | 3.50  | min         | -7.36 |
| u : | 3.00  |             |       |
| t : | 2.50  | Scale = E-4 |       |
| s : | 2.00  |             |       |
| r : | 1.50  |             |       |
| q : | 1.00  |             |       |
| p : | 0.50  |             |       |
| o : | 0.00  |             |       |
| n : | -0.50 |             |       |
| m : | -1.00 |             |       |
| l : | -1.50 |             |       |
| k : | -2.00 |             |       |
| j : | -2.50 |             |       |
| i : | -3.00 |             |       |
| h : | -3.50 |             |       |

LONGVIBWEDGE02: Grid#1 p2 Nodes=719 Cells=330 RMS Err= 1.2e-4  
Stage 4

### Contour Plot of Solid Body Displacements

## Summary:

A finite element analysis model has been developed to study the vibration in a wedge shaped Pyrex glass faceplate bonded to an acoustic wave generating piezoelectric transducer.