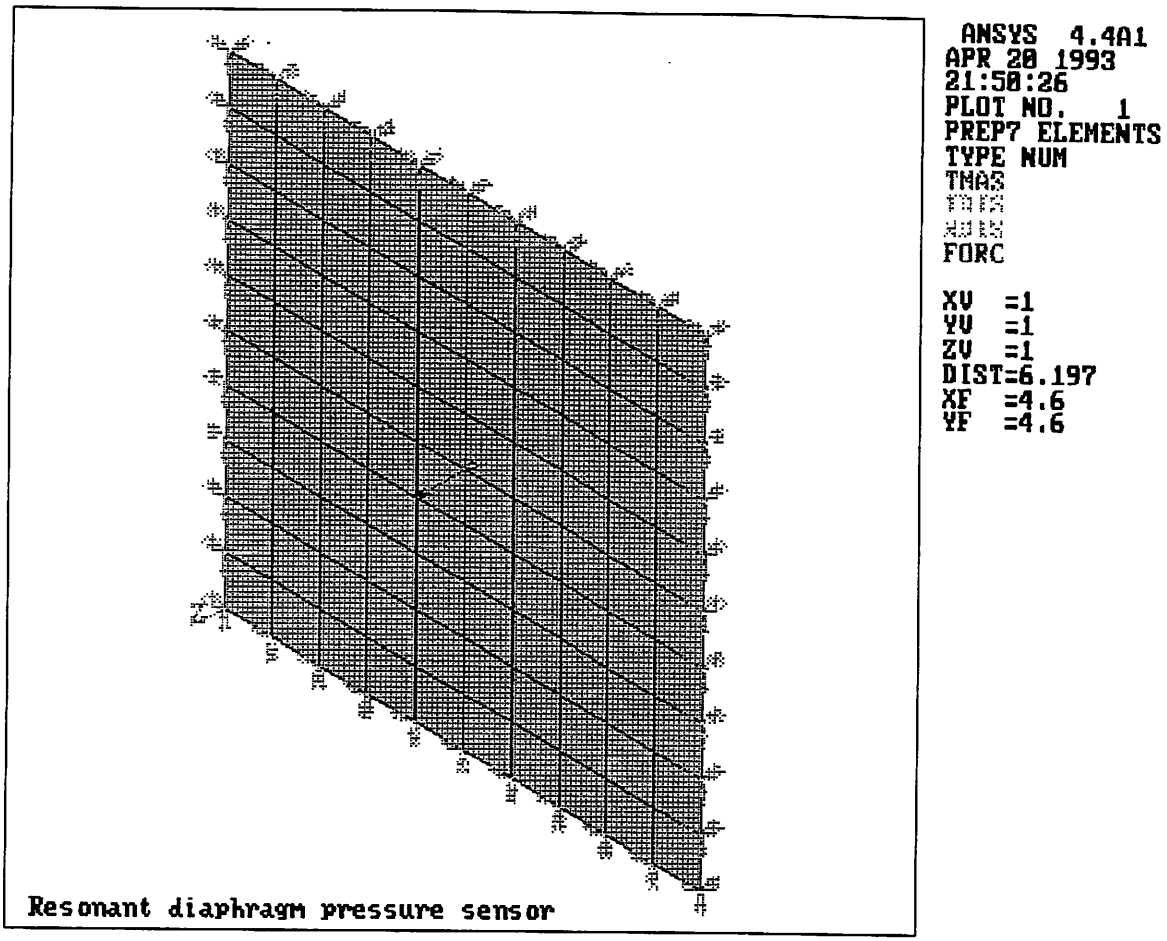
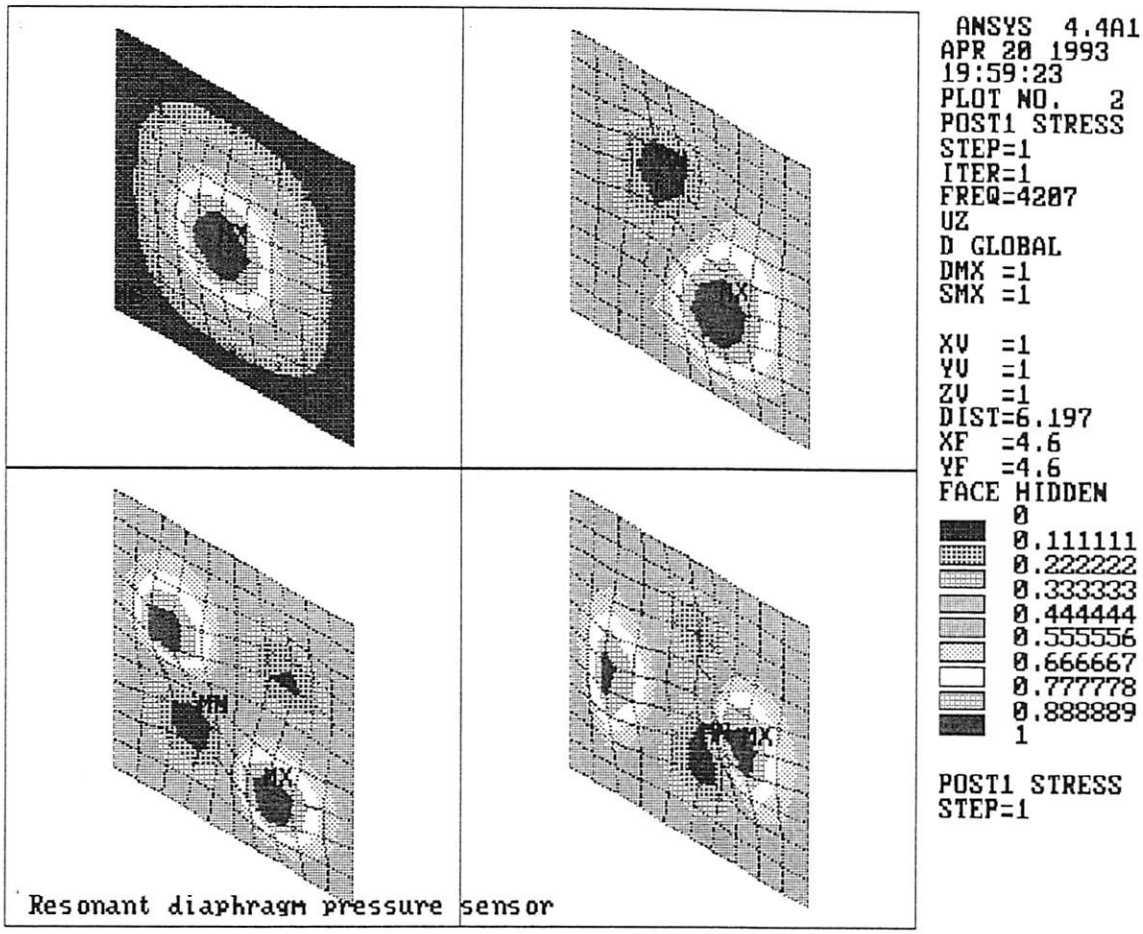
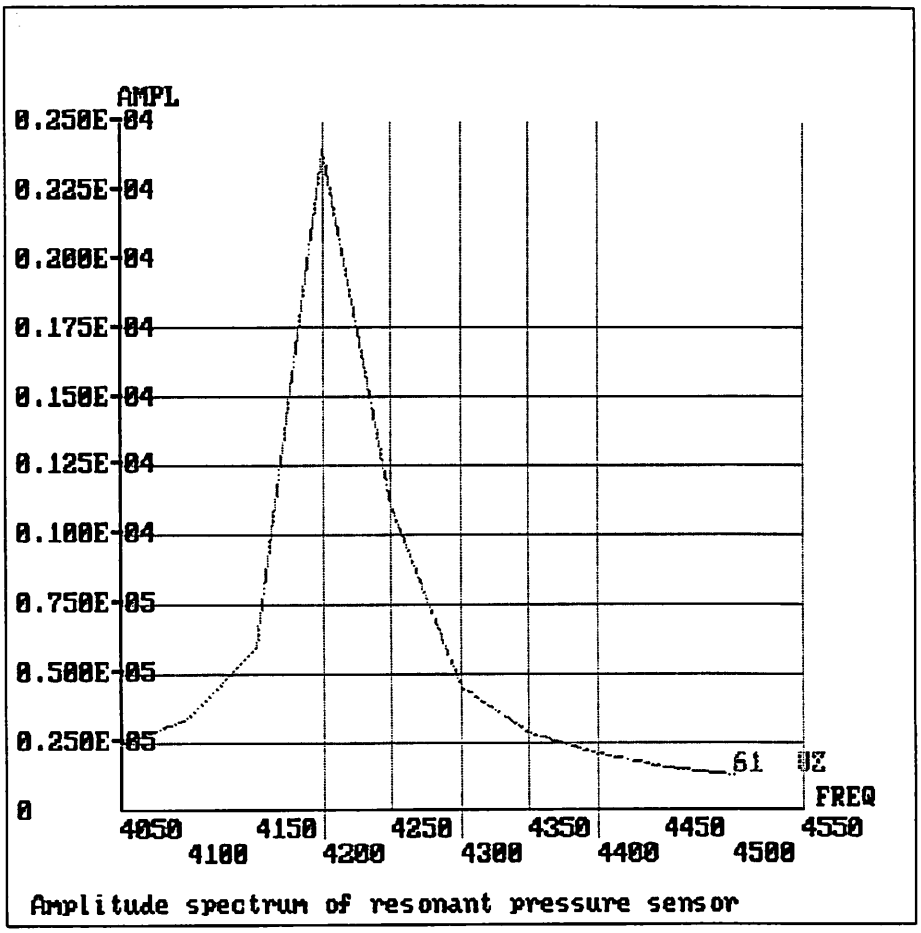
The figure below illustrates the geometry and the mesh density by using 2-D four node solid shell elements. The full model is used in order to resolve all flexure bending mode shapes. The excitation forcing function is visible at the midside node of the diaphragm as defined in RESP-K6.ANL.



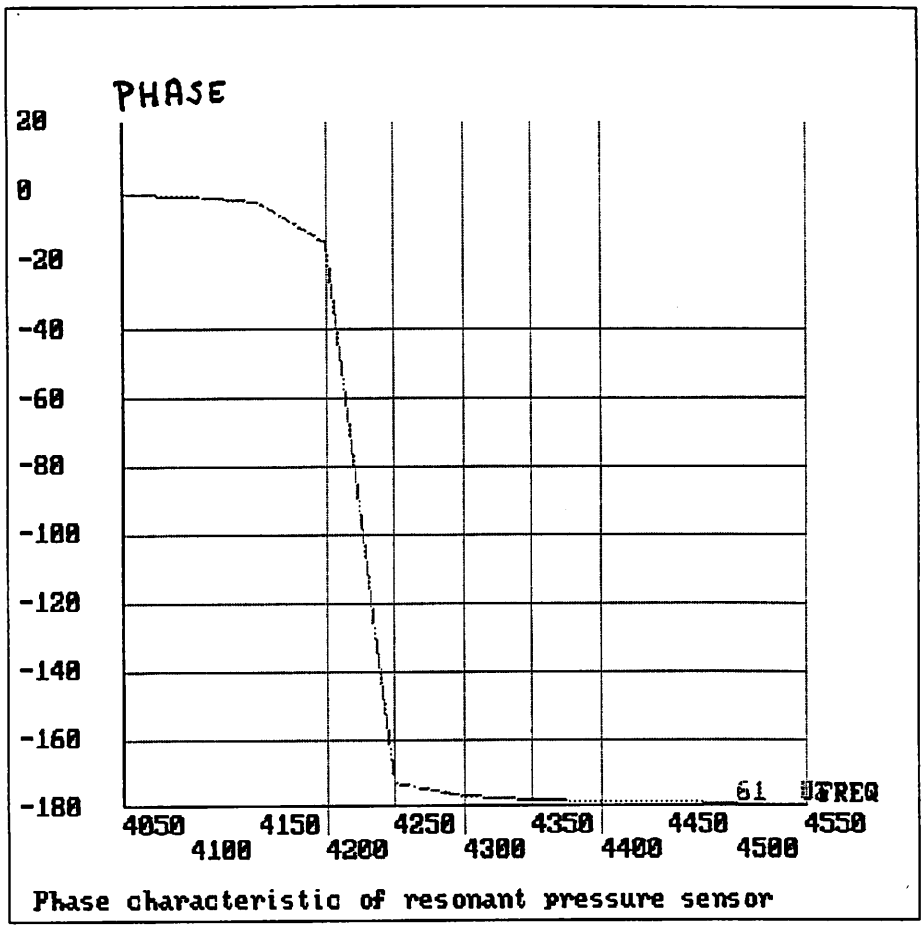
Plot of the first flexure mode shapes of the resonant pressure sensor. This pictures are stored in the file RESPRES.PIC and can be visualized by the DISPLAY-program without running ANSYS. For further information see also chapters 4.3.2 and 4.3.3.



Plot of the amplitude and phase characteristics of the resonant pressure sensor near the first flexure resonance (f = 4.2 kHz):



Amplitude spectrum of resonant pressure sensor

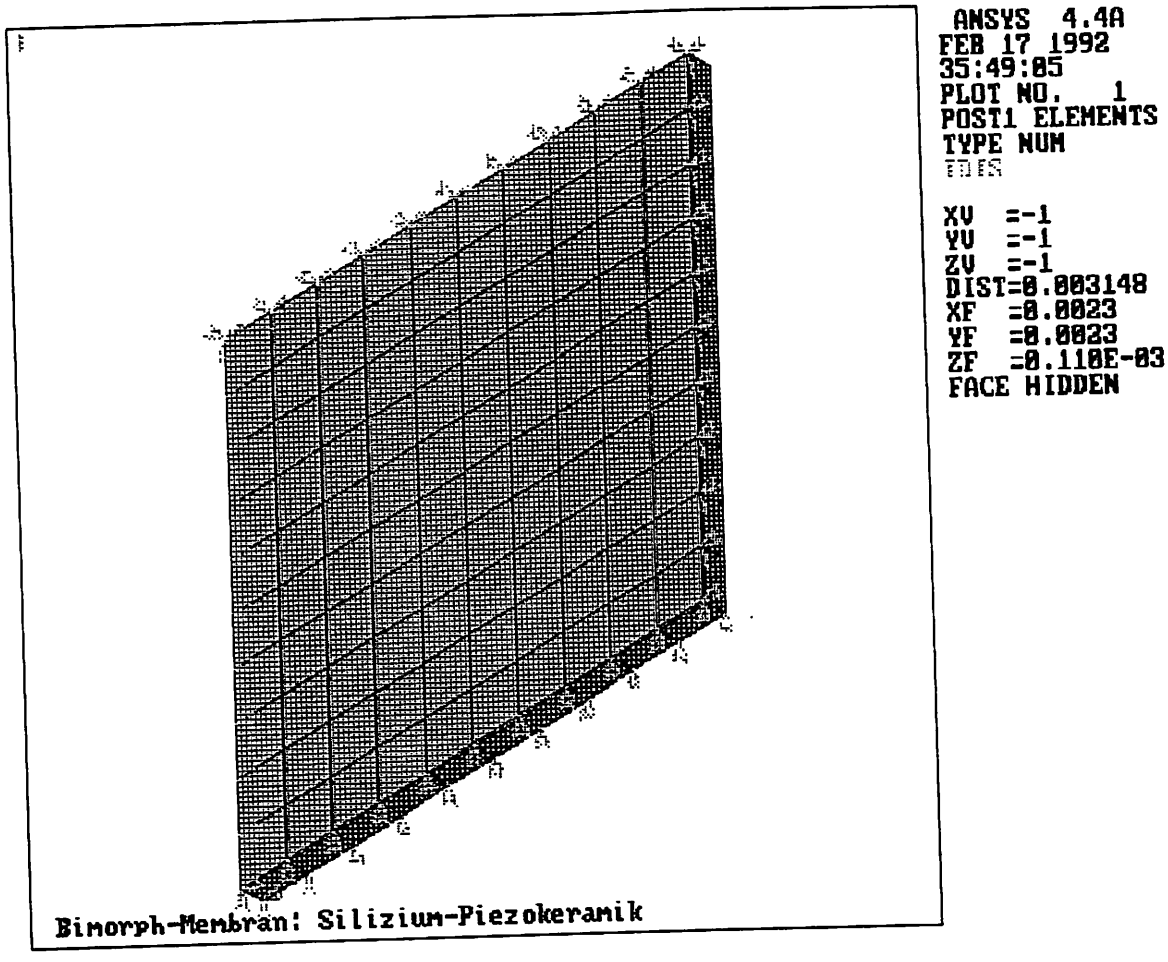


Phase characteristic of resonant pressure sensor

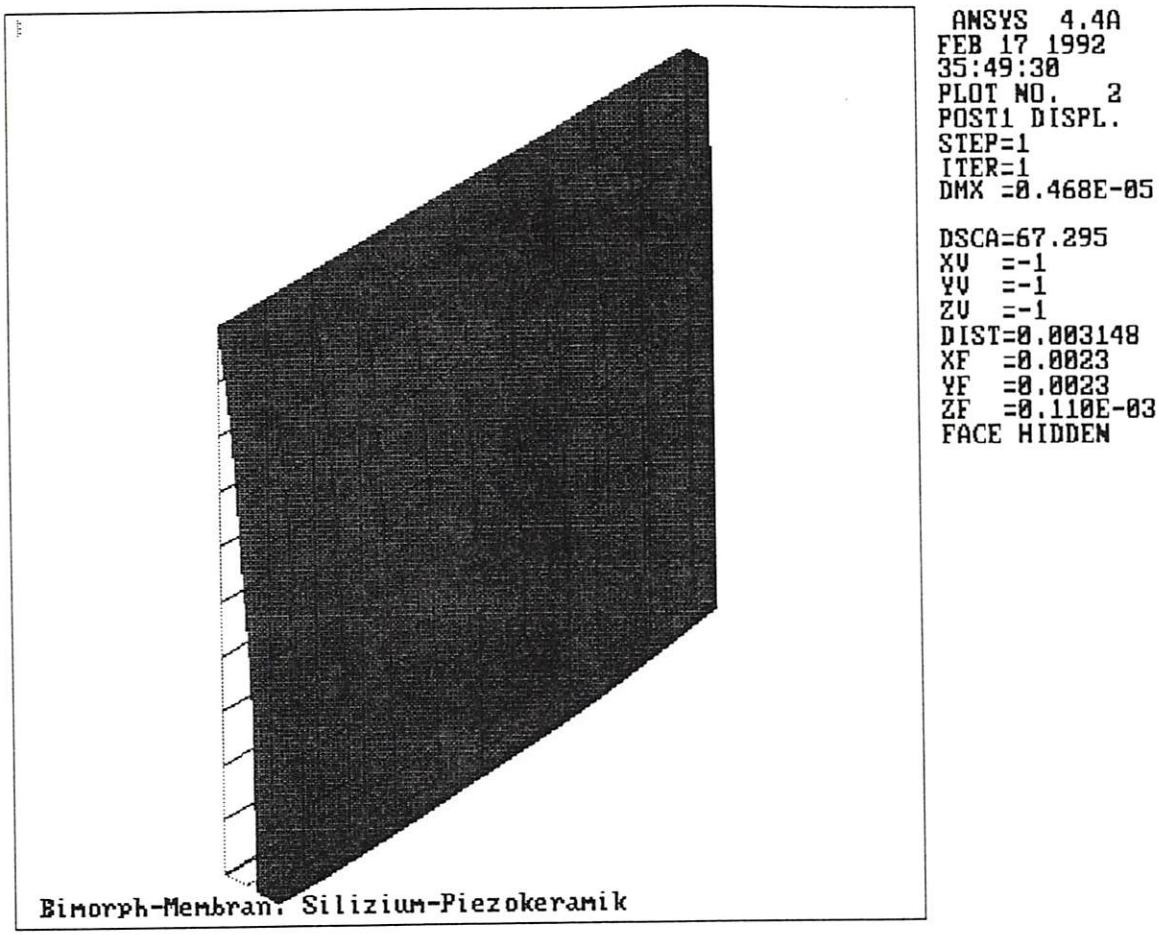
Changing parameters:

Some predefined parameters may be changed without affecting the mesh or FE-boundary conditions: Excitation voltage of the piezoceramic, geometry parameters and number of modes to be calculated.

The figure below illustrates the geometry and the mesh density of the bimorph structure.

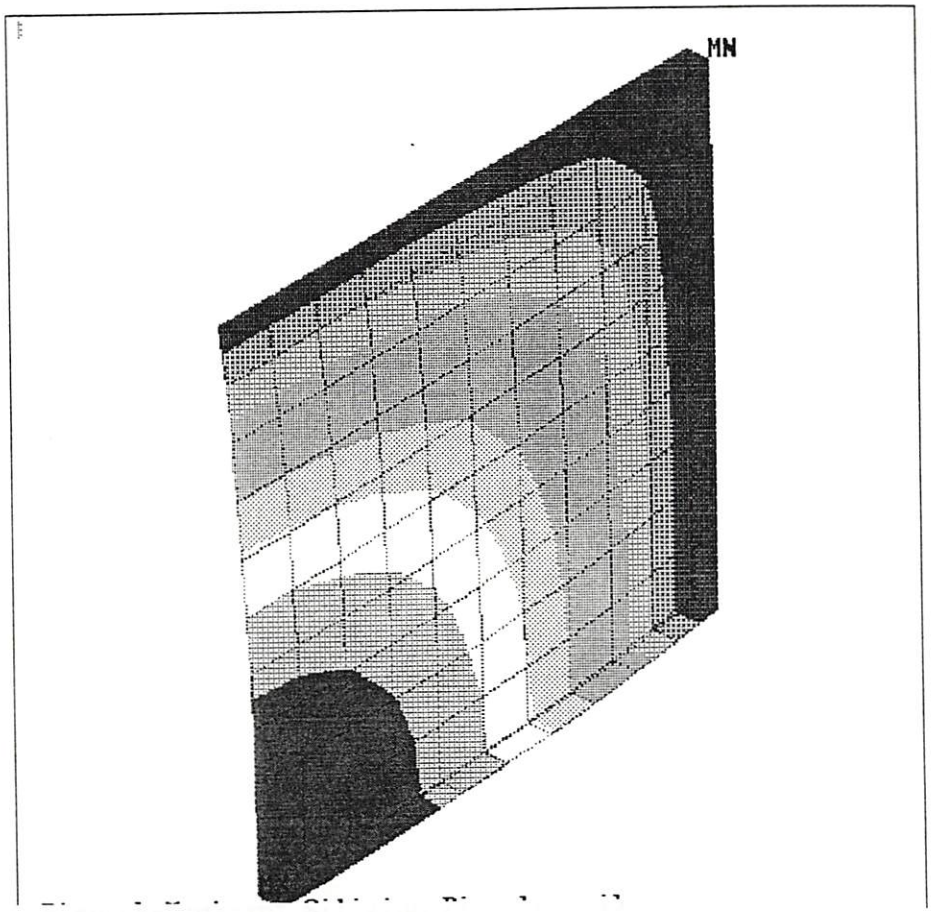


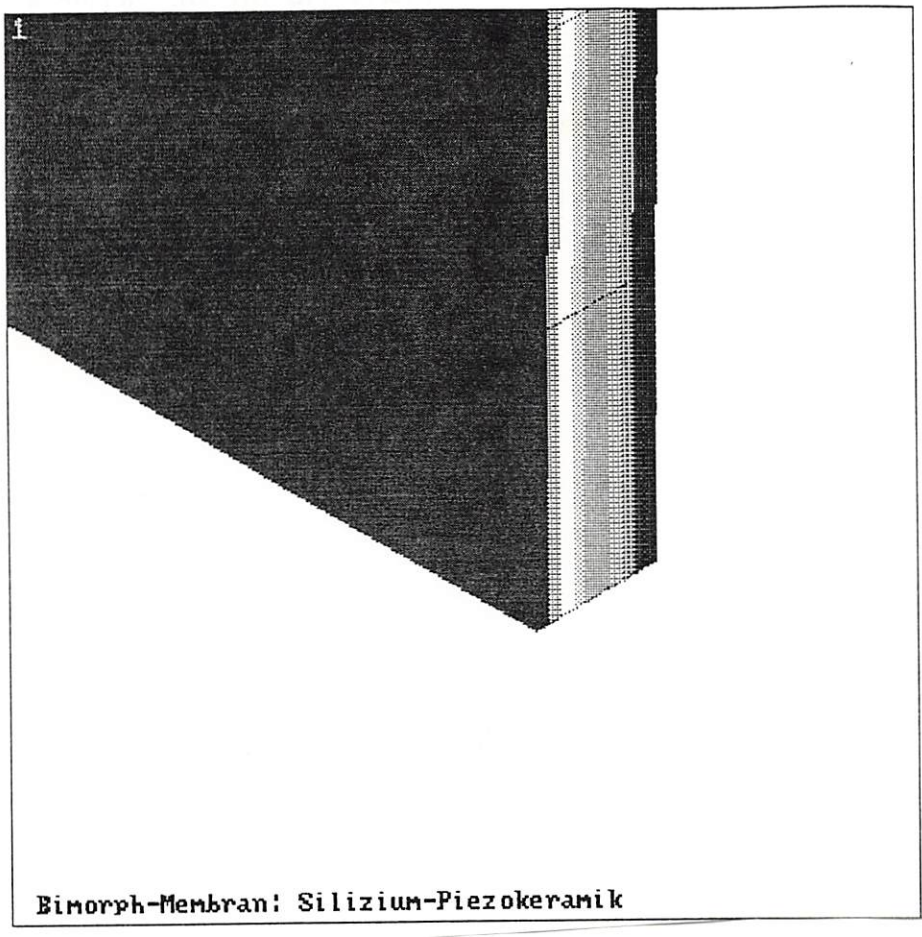
```
/COM ********************************************************
/COM
/COM File: BIM-K0.MAC
/COM
/COM ********************************************************
/COM Piezoelectric BIMORPH Microactuator
/COM evaluate results of STATIC ANALYSIS (KAN=0)
/COM ********************************************************

/POST1                ! enter general Post-processor
/VIEW,1,1,1,1         ! define viewing direction
! /VUP,,Z             ! for horizontal display
set                   ! load results (last iteration, if converged)

/COM ************** plot stresses and displacements
pldi,1                ! plot diaphragm deflection
plns,volt             ! plot electric voltage distribution
plns,sig1,1           ! plot stress SIG1, but unaveraged
plns,uz               ! plot displacements in z-direction

/COM ********************************************************
/COM to look for more items enter:
/COM
/COM   plns,ITEM  : where ITEM is SX, SY, SIG1, UX, UY
/COM
/COM leave Post-processor with "fini"-command

/COM ***************** MACRO finished successfully ***************
```



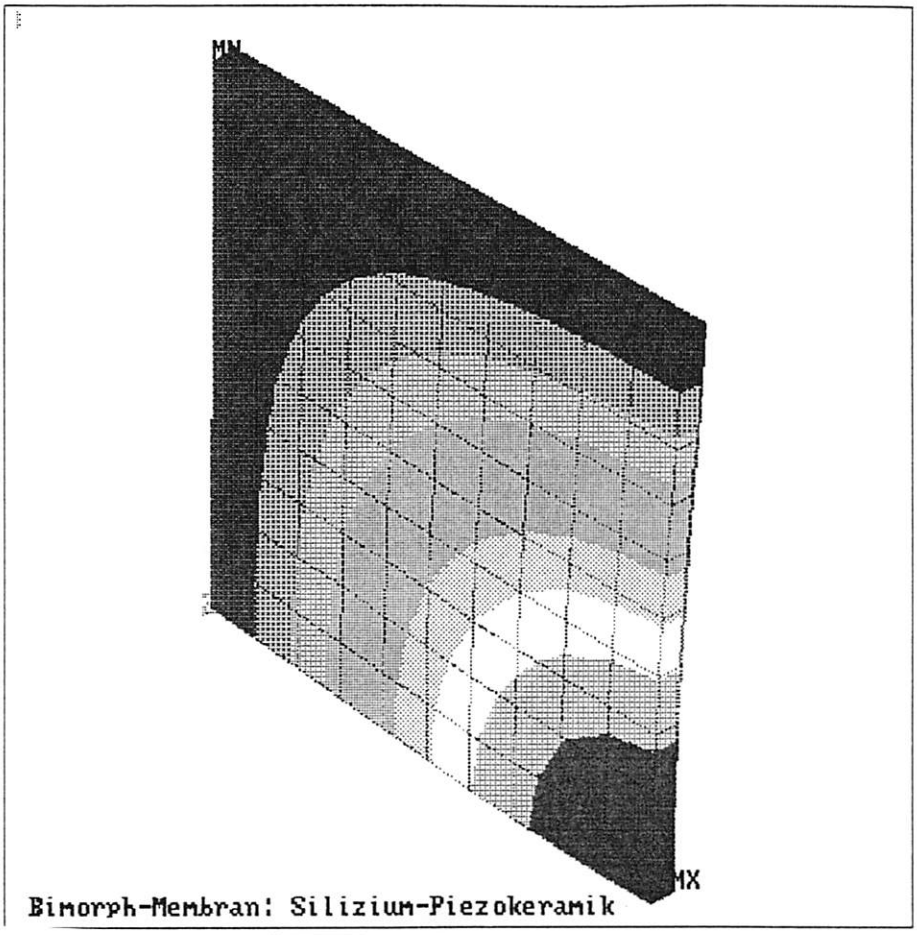
TOP: Plot of the mechanical displacements (m) of ten microactuator due to piezoelectric excitation.

Bottom: Plot of the voltage distribution defined by in the preprocessing (Note that 1 V coressponds to 1e-9 V).





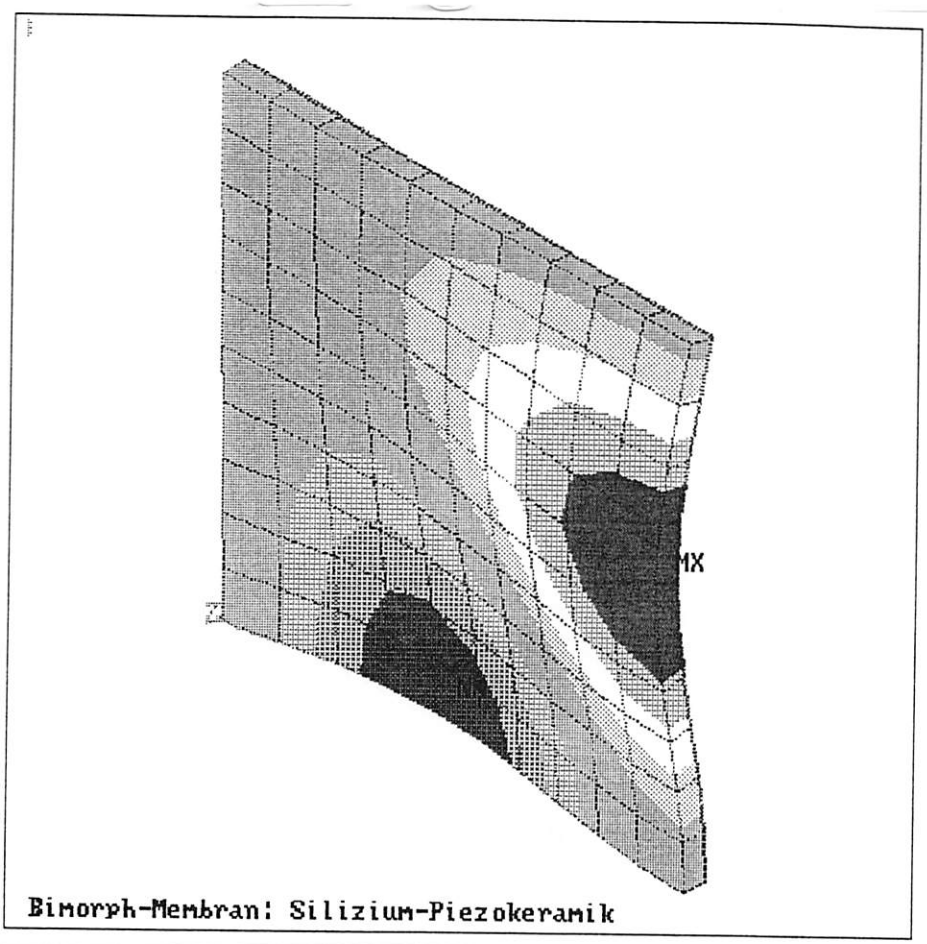
Plot of the first flexure mode shapes of the piezoelectrical driven microactuator. For further information see also chapters 4.4.3.



ANSYS 4.4A
OCT 21 1991
15:23:47
PLOT NO. 1
POST1 STRESS
STEP=1
ITER=1
FREQ=11613
UZ
D GLOBAL
DMX =1.002
SMN =-0.518E-03
SMX =1.002

XV =1
YV =1
ZV =1
DIST=0.003148
XF =0.0023
YF =0.0023
ZF =0.110E-03

-0.518E-03
0.110823
0.222164
0.333505
0.444846
0.556187
0.667528
0.778869
0.89021
1.002



ANSYS 4.4A
OCT 21 1991
15:23:56
PLOT NO. 2
POST1 STRESS
STEP=1
ITER=2
FREQ=45913
UZ
D GLOBAL
DMX =1.004
SMN =-0.999665
SMX =1.004

XV =1
YV =1
ZV =1
DIST=0.003148
XF =0.0023
YF =0.0023
ZF =0.110E-03

-0.999665
-0.777073
-0.554482
-0.33189
-0.109299
0.113292
0.335884
0.558475
0.781066
1.004

Plot of the first flexure mode shapes of the piezoelectrical driven microactuator. For further information see also chapters 4.4.3.