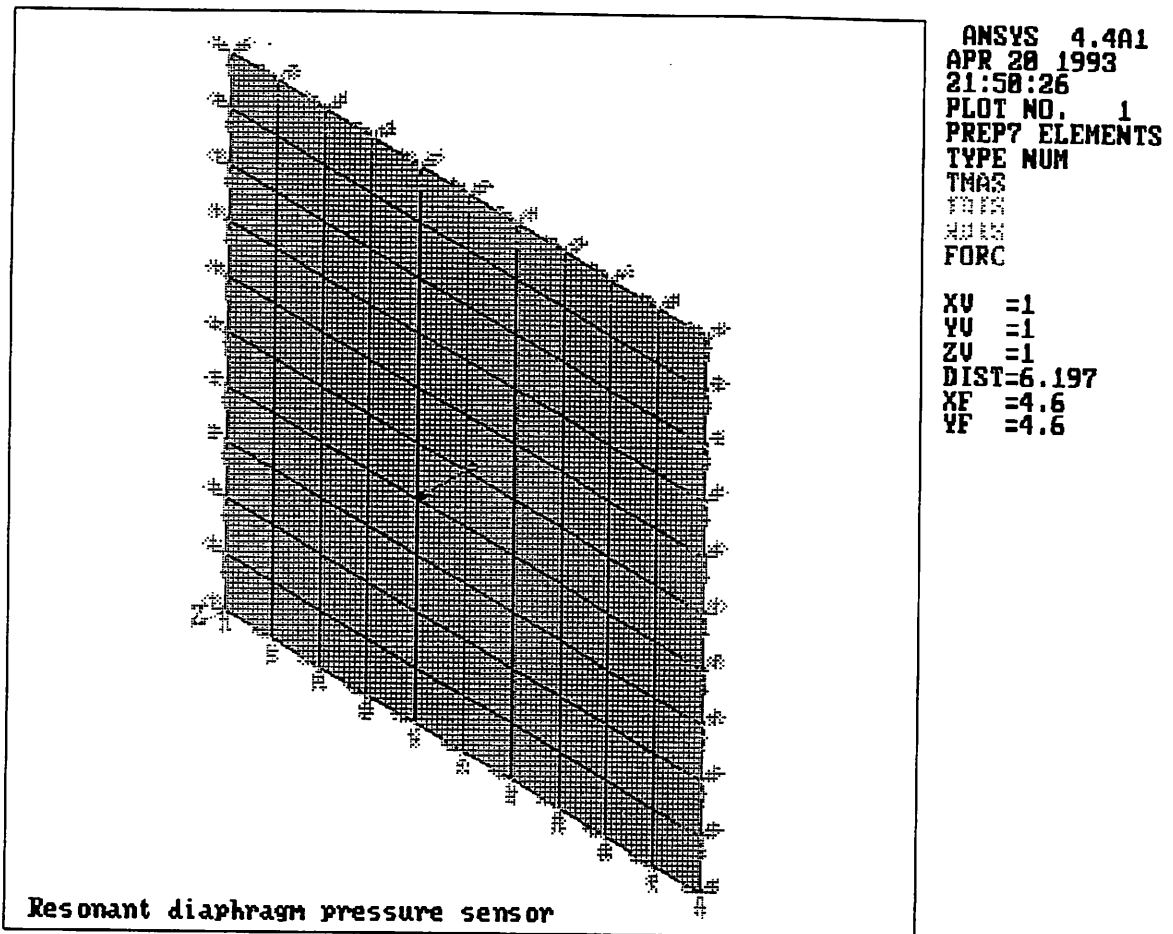
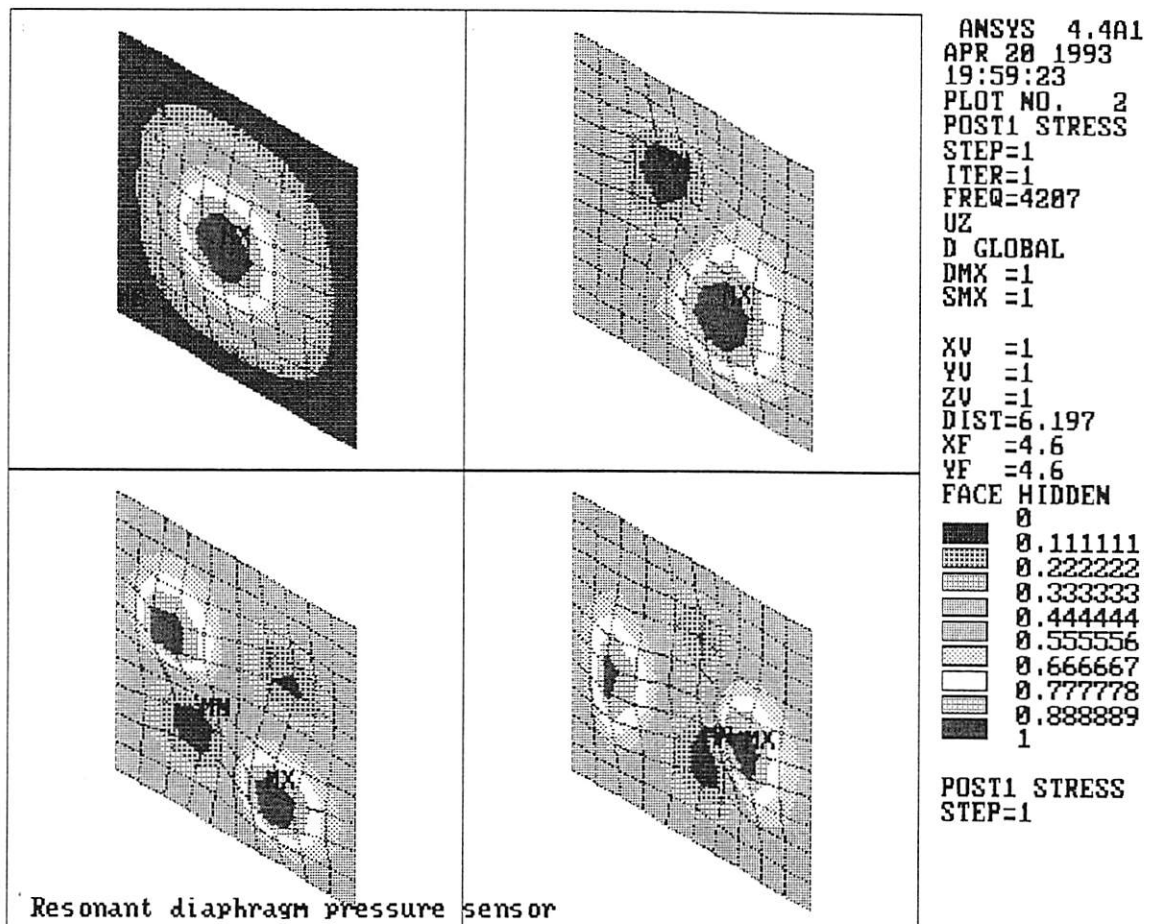


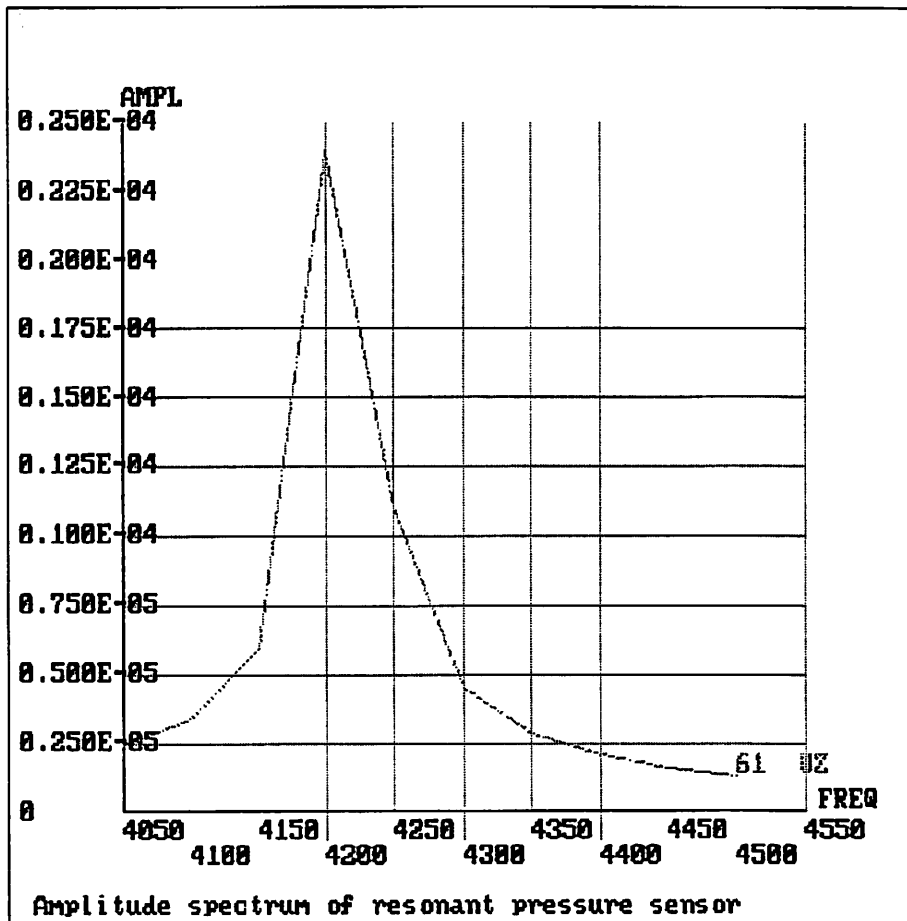
The figure below illustrates the geometry and the mesh density by using 2-D four node solid shell elements. The full model is used in order to resolve all flexure bending mode shapes. The excitation forcing function is visible at the midside node of the diaphragm as defined in RESP-K6.ANL.



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.

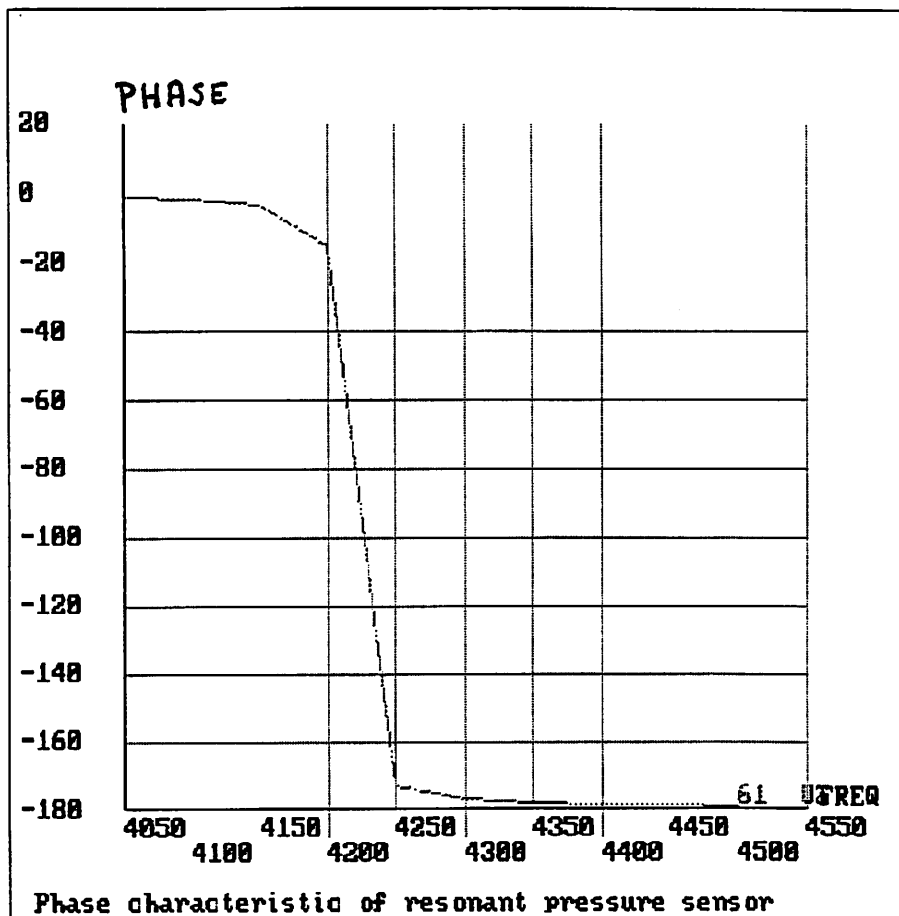


Plot of the amplitude and phase characteristics of the resonant pressure sensor near the first flexure resonance ( $f = 4.2$  kHz):



ANSYS 4.4A1  
APR 28 1993  
20:35:03  
PLOT NO. 3  
POST26  
AMPLITUDE

ZU =1  
DIST=0.6666  
XF =0.5  
YF =0.5  
ZF =0.5



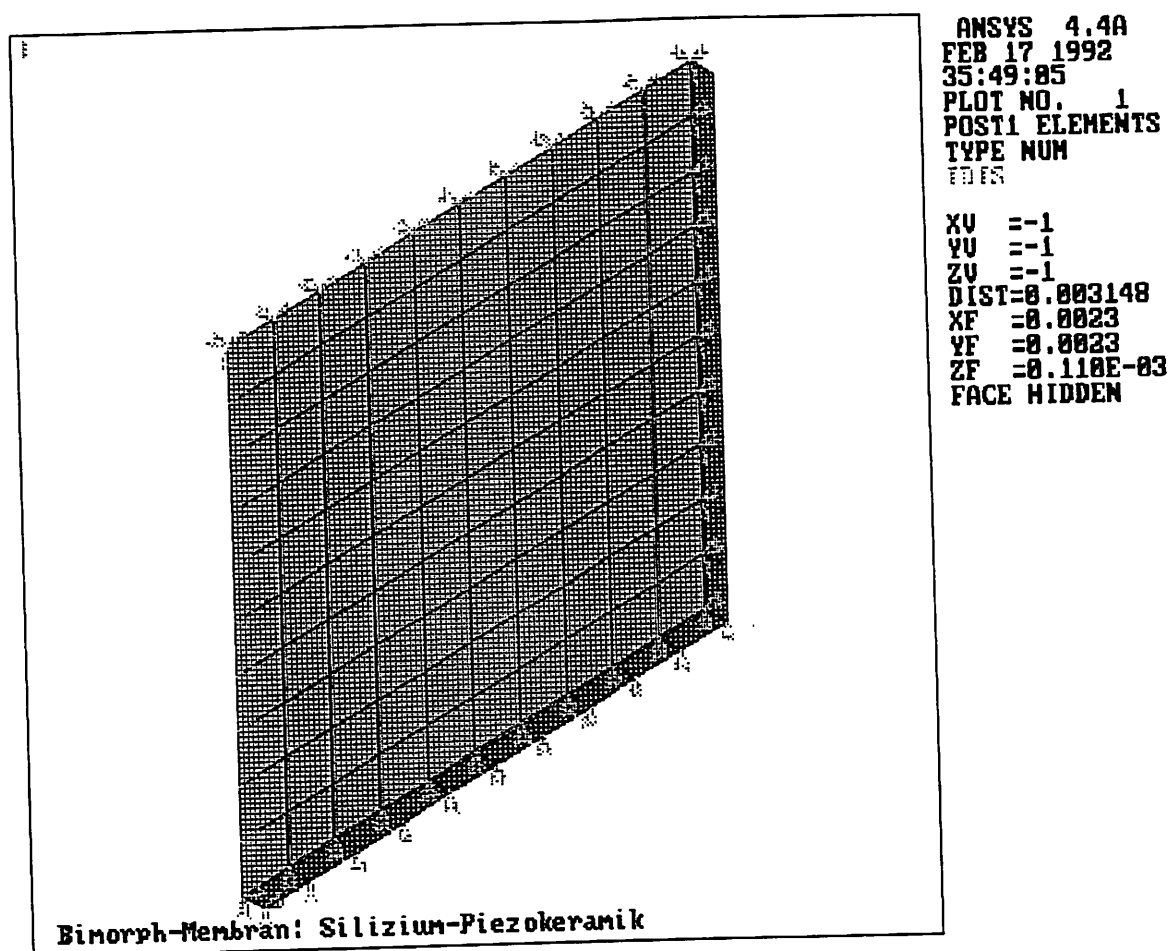
ANSYS 4.4A1  
APR 28 1993  
20:36:04  
PLOT NO. 4  
POST26  
PHASE ANGLE

ZU =1  
DIST=0.6666  
XF =0.5  
YF =0.5  
ZF =0.5

### 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 *****

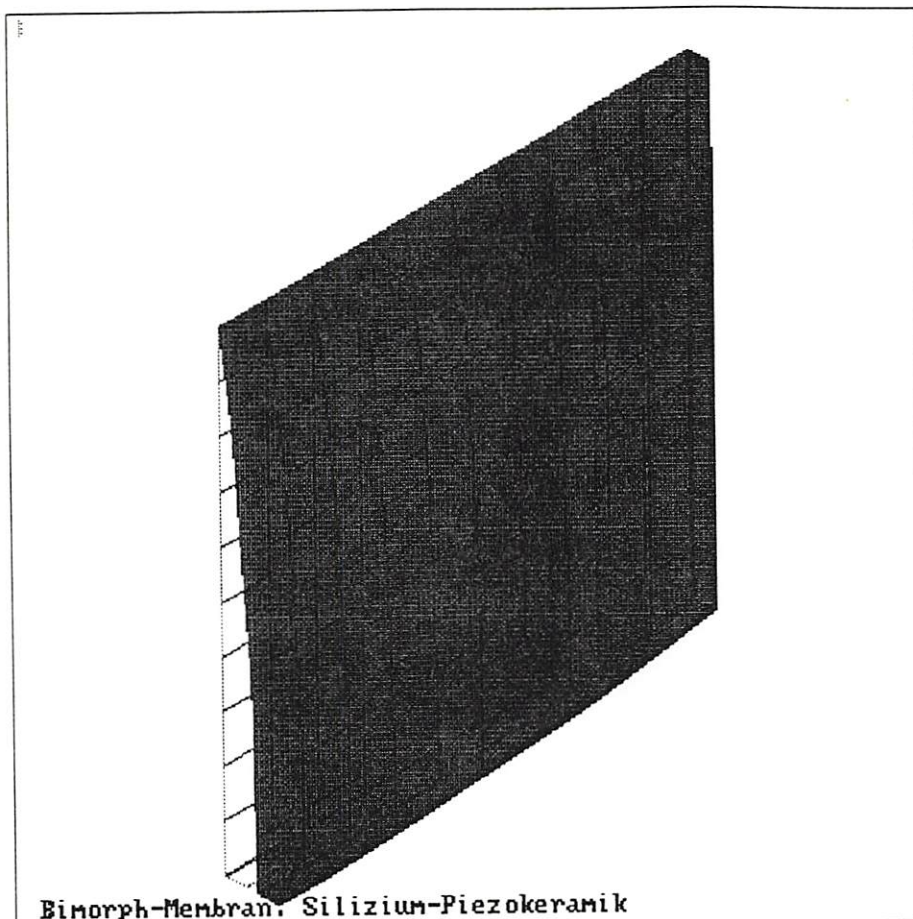
/POST1          ! enter general Post-processor
/VIEW,1,1,1,1   ! define viewing direction
! /VUP,,Z       ! for horizontal display
set             ! load results (last iteration, if converged)

/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 *****

```



```

ANSYS 4.4A
FEB 17 1992
35:49:30
PLOT NO. 2
POST1 DISPL.
STEP=1
ITER=1
DMX =0.468E-05

DSCA=67.295
XV =-1
YV =-1
ZV =-1
DIST=0.003148
XF =0.0023
YF =0.0023
ZF =0.110E-03
FACE HIDDEN

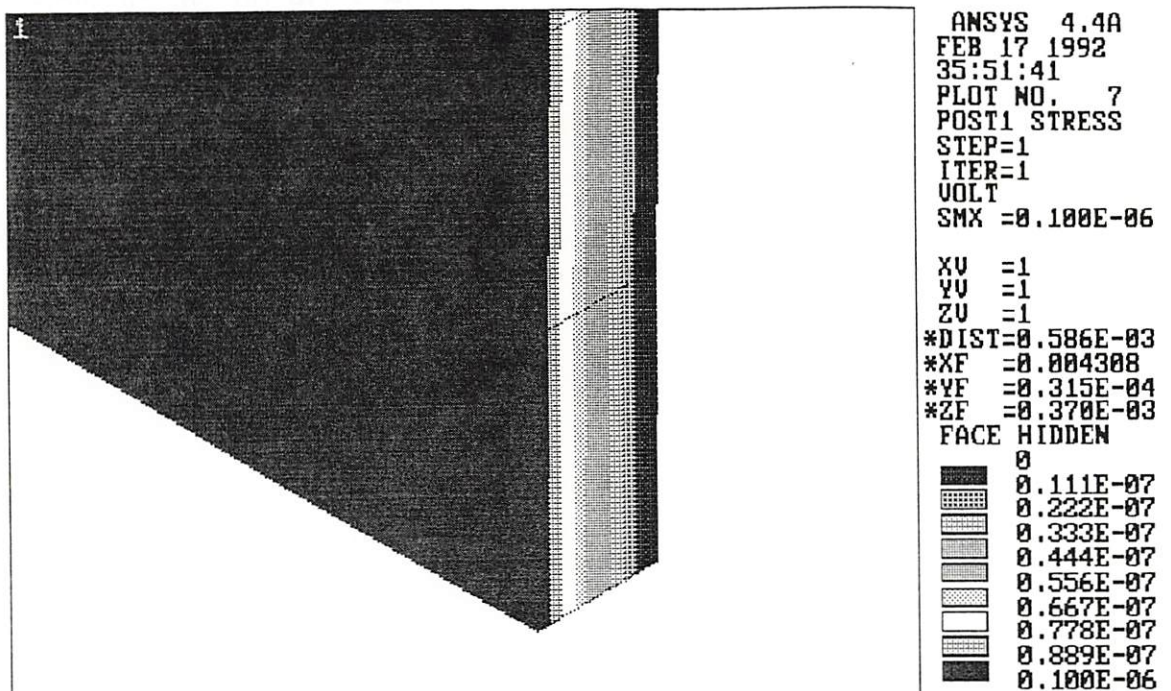
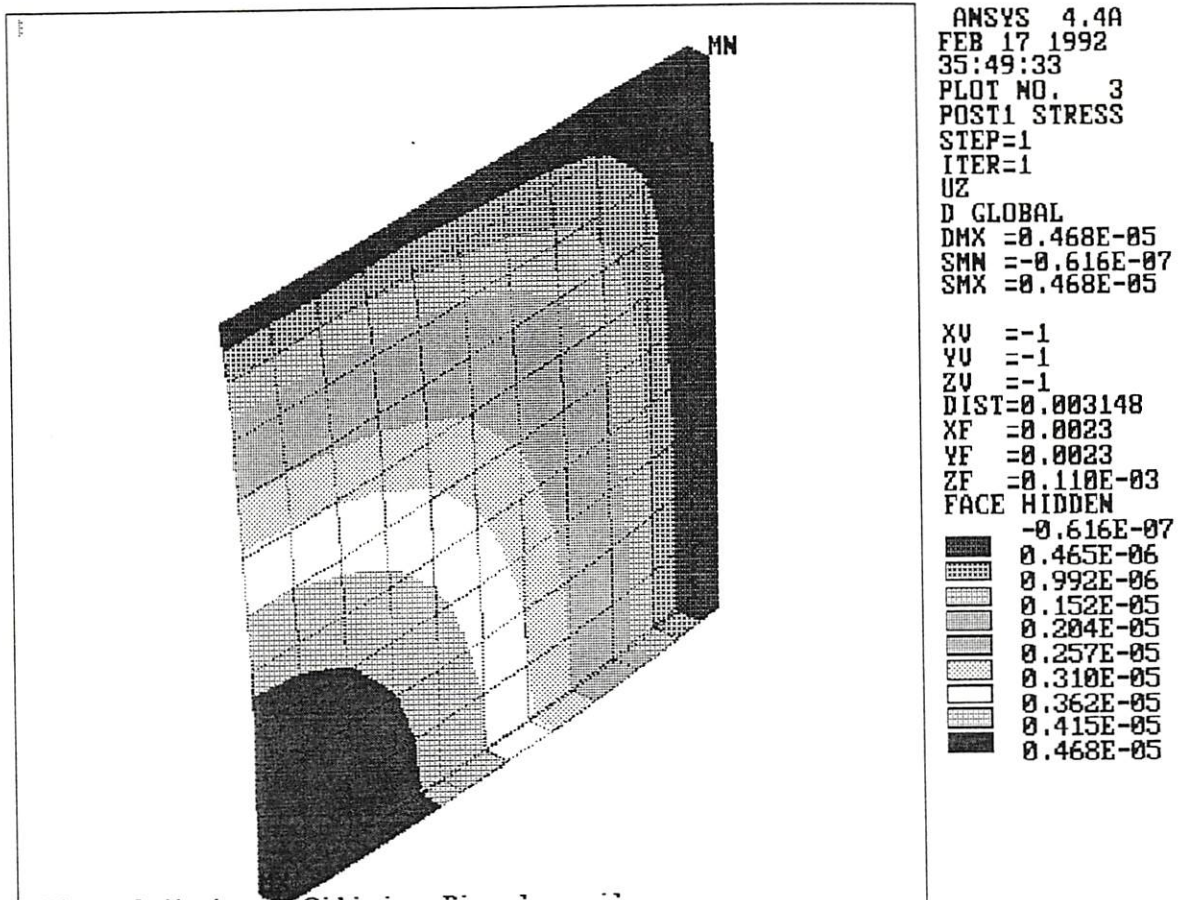
```

12



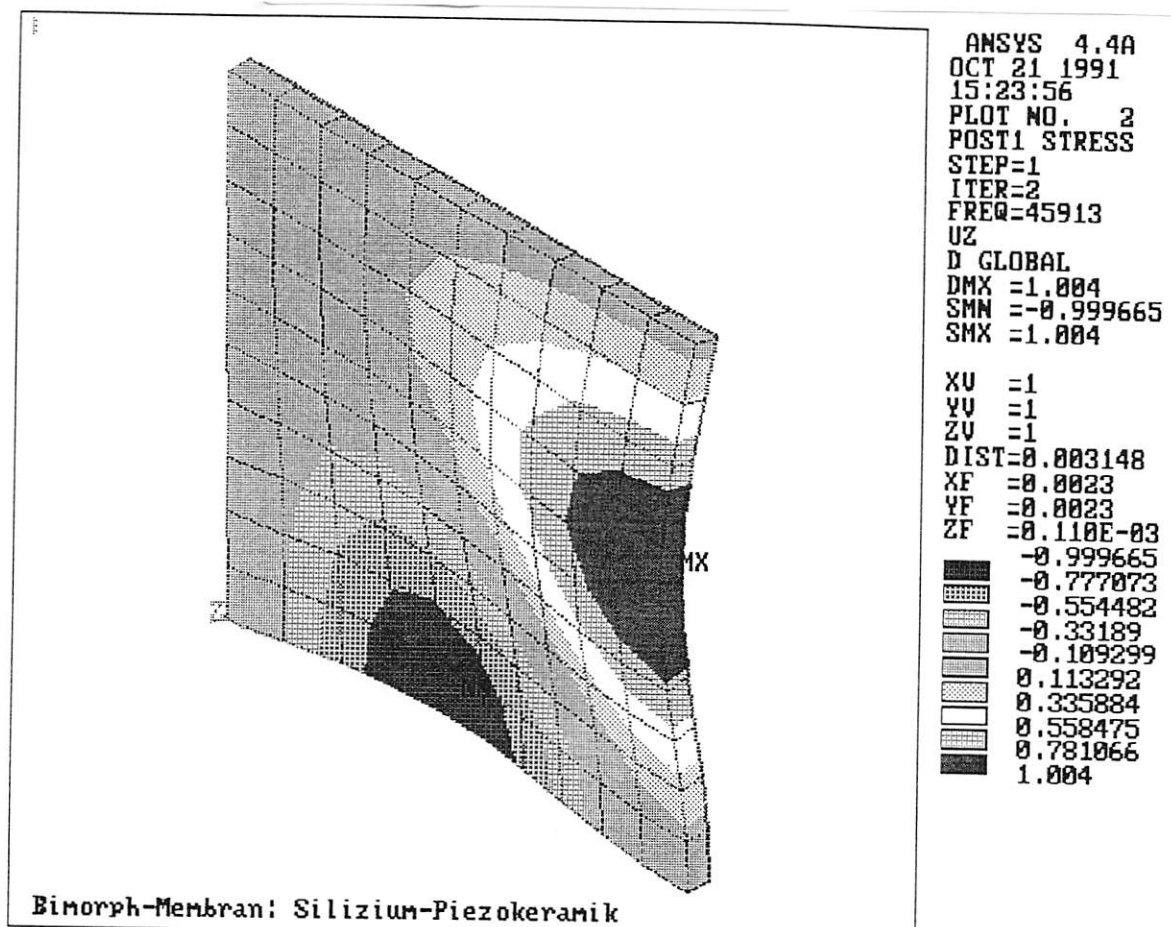
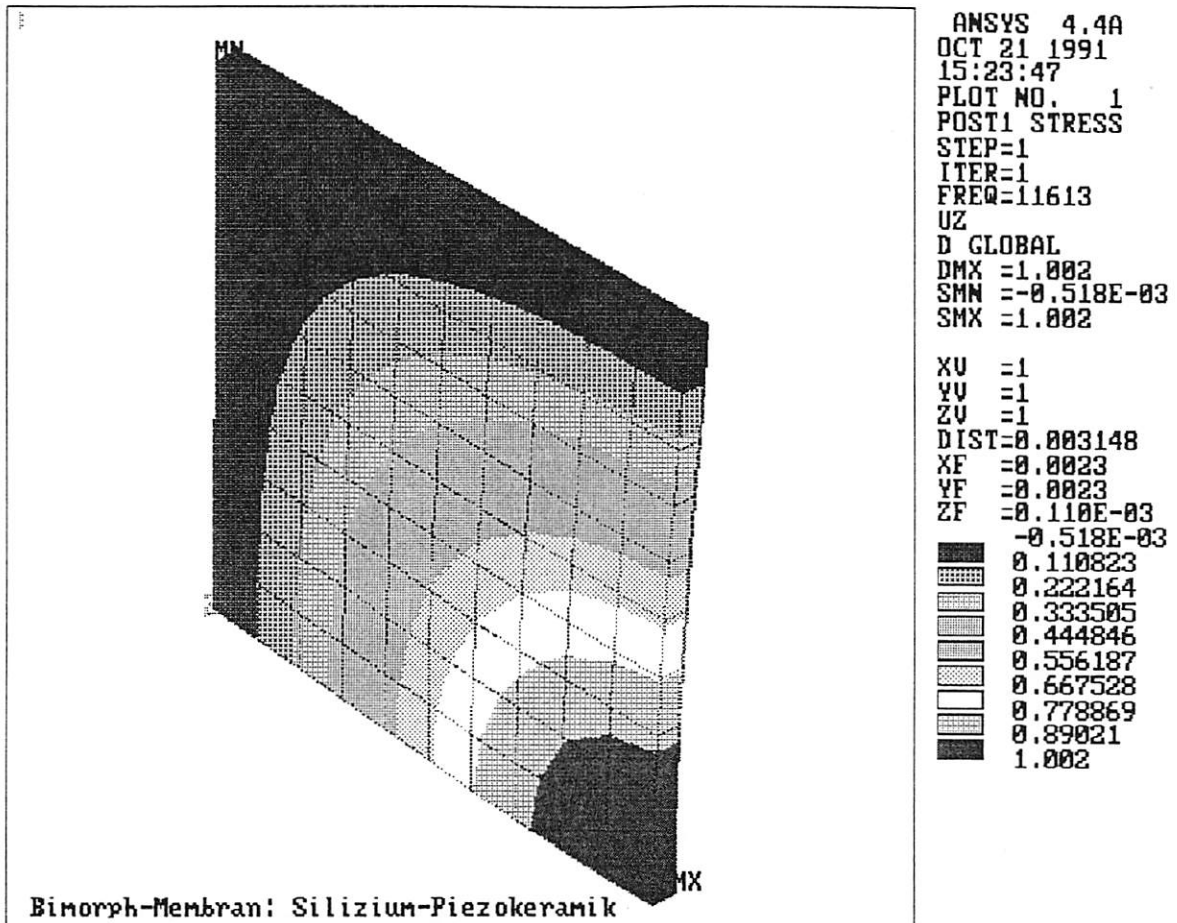
TOP: Plot of the mechanical displacements (m) of the microactuator due to piezoelectric excitation.

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



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



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

