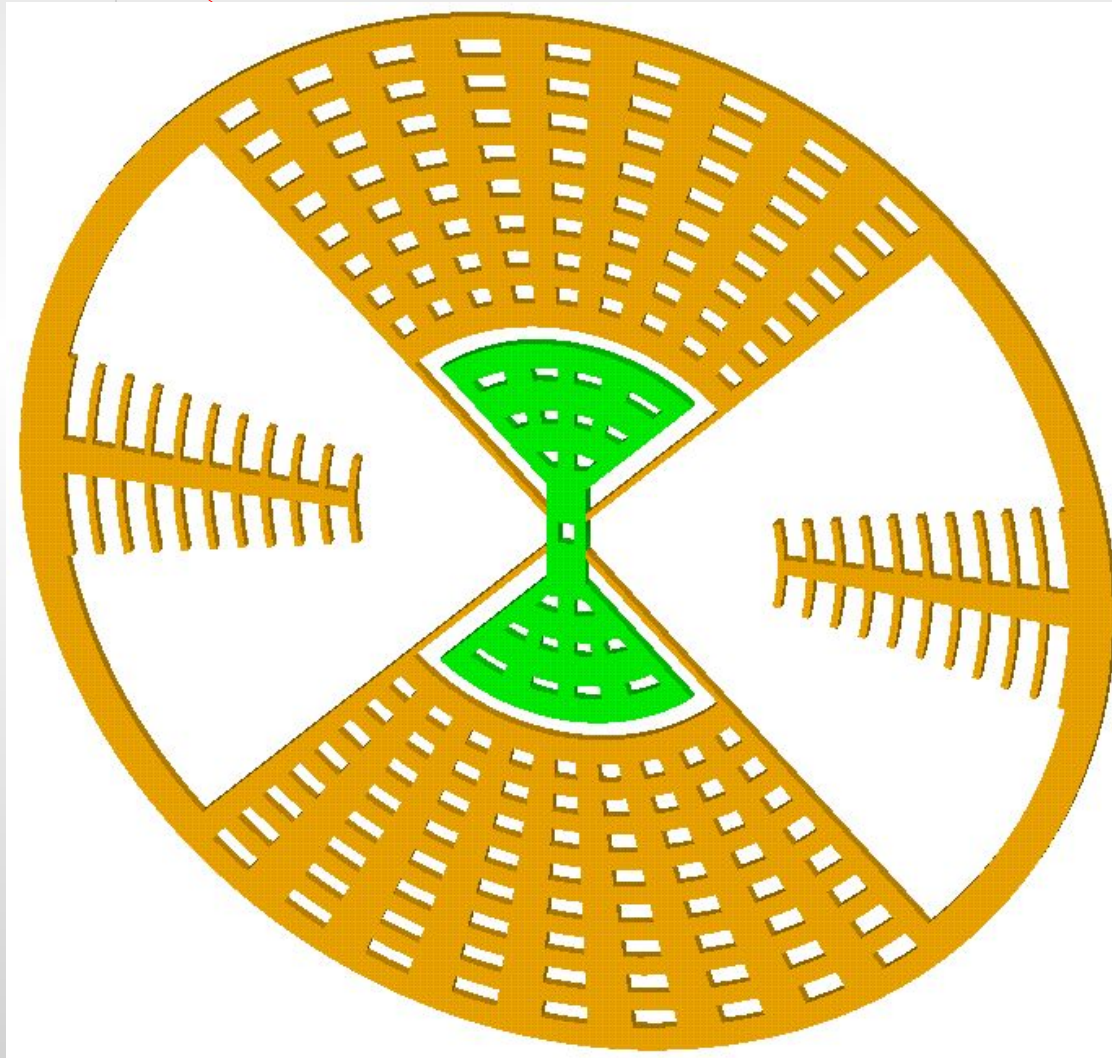


# Finite element modeling and modal analysis of micromechanical gyroscope sensitive element

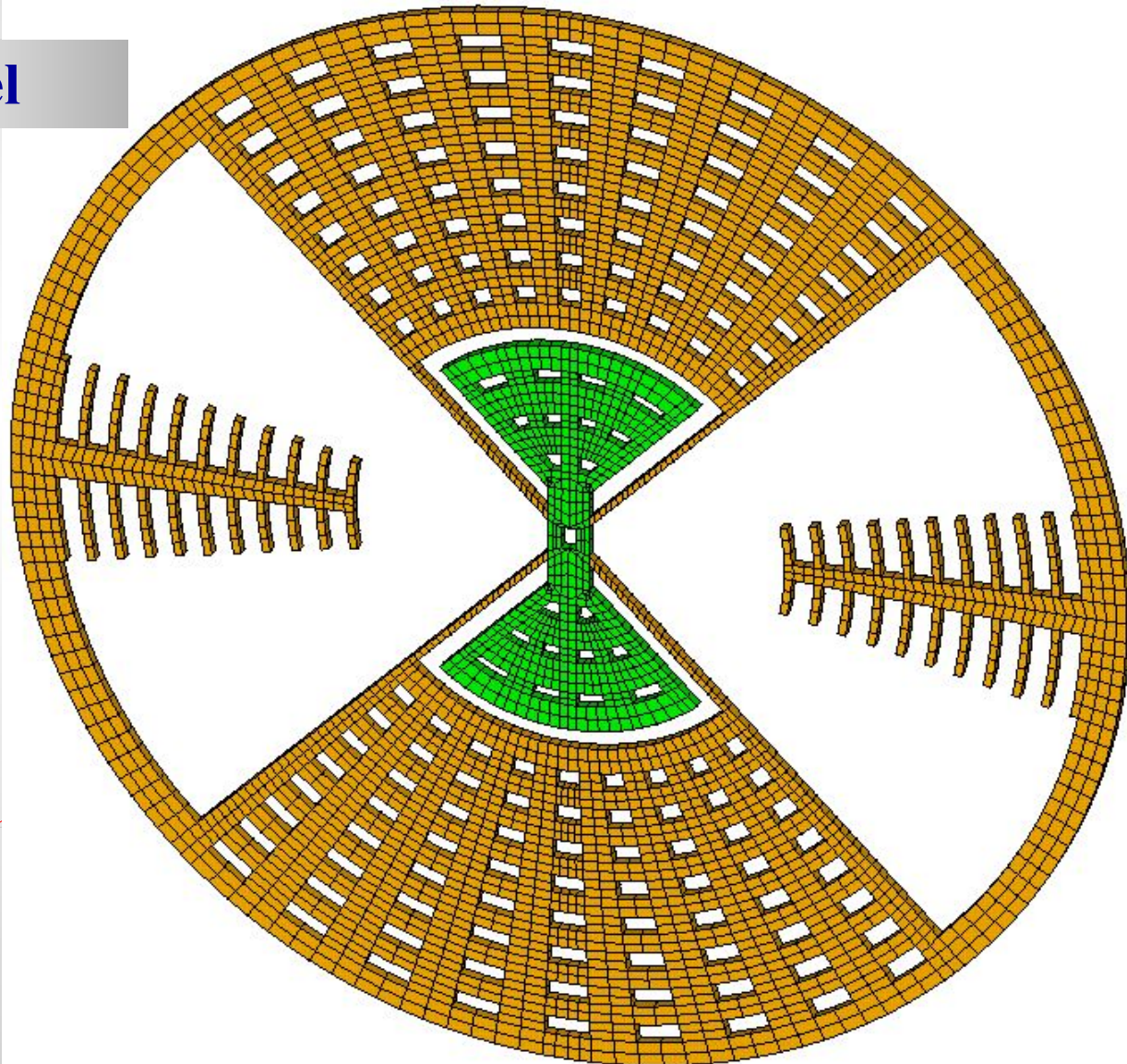
3D model



# Finite element modeling and modal analysis of micromechanical gyroscope sensitive element

**3D FE model**

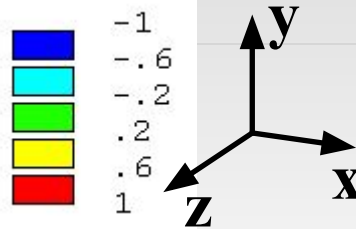
**NE = 3328**  
**NDF = 88416**



# Finite element modeling and modal analysis of micromechanical gyroscope sensitive element

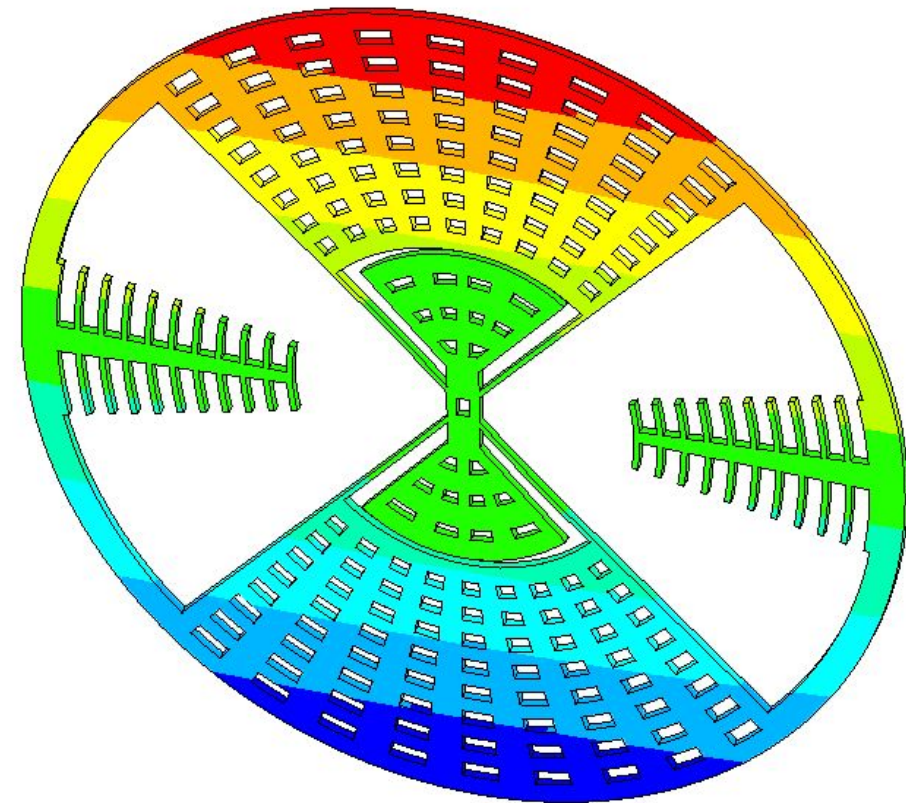
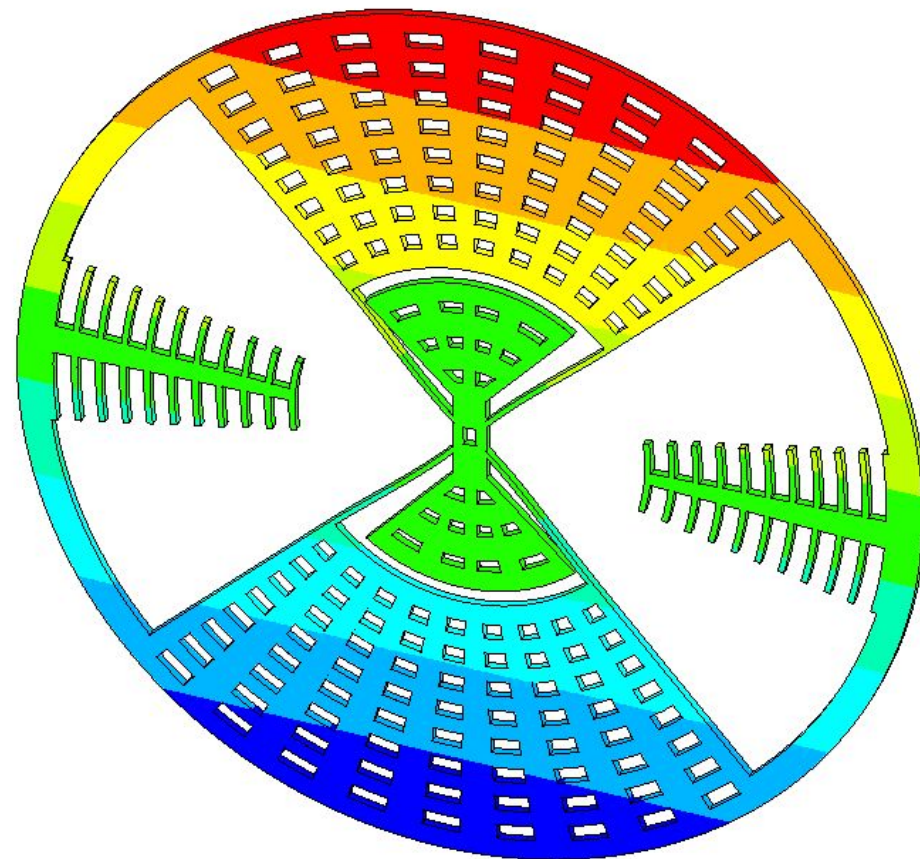
First natural mode

$F_1$



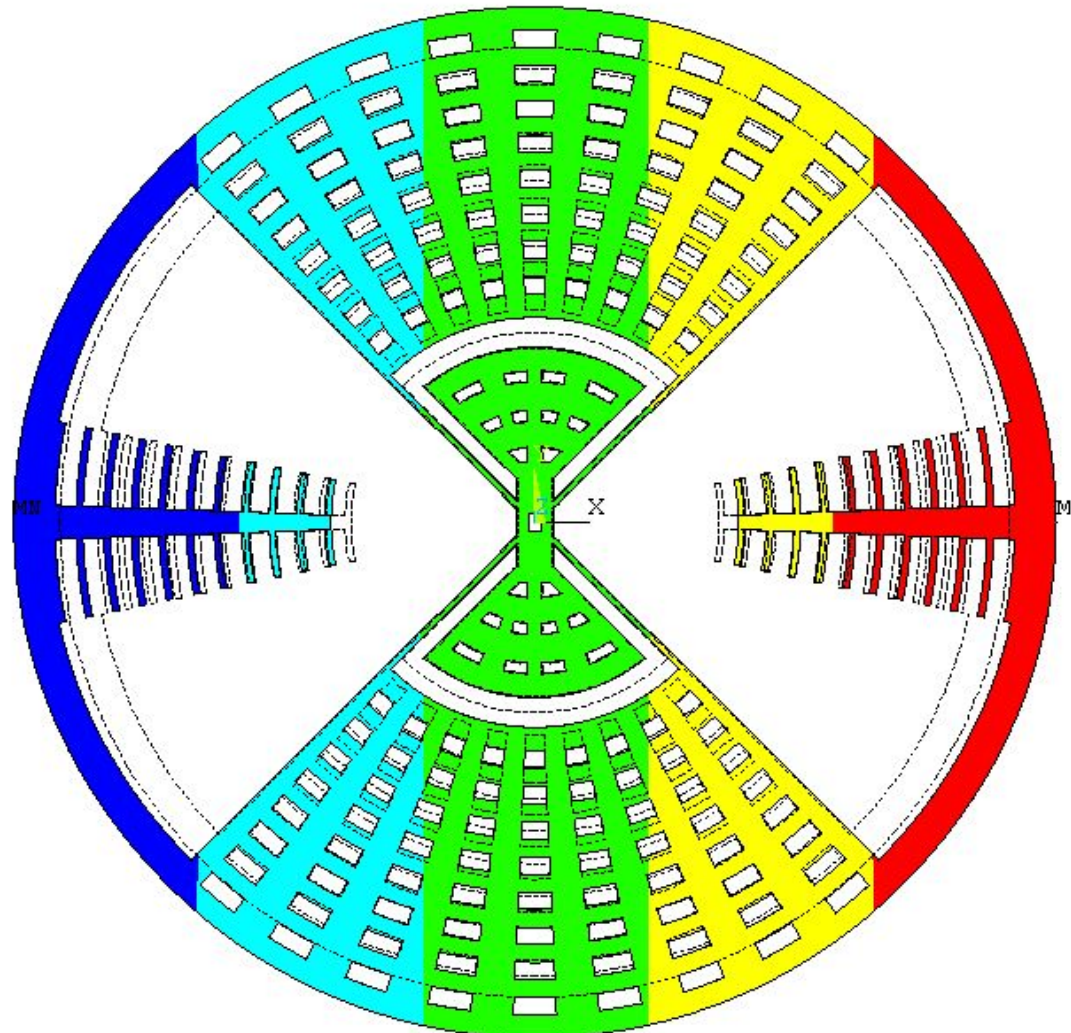
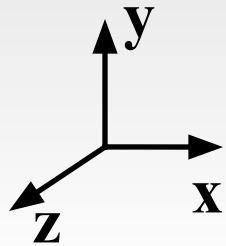
Second natural mode

$F_2$



# Finite element modeling and modal analysis of micromechanical gyroscope sensitive element

## Displacements $U_x$

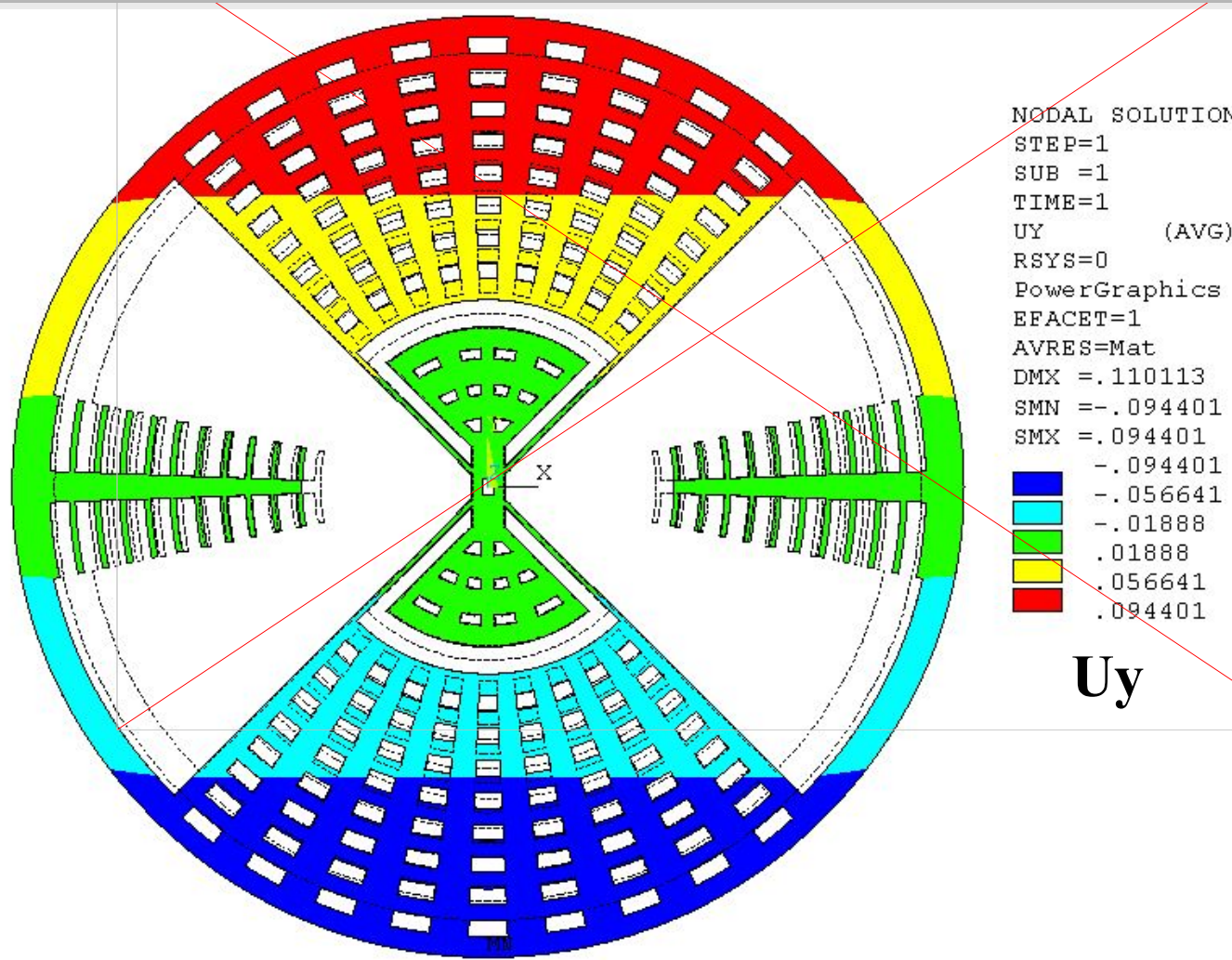
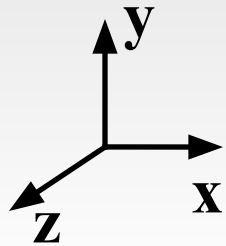


```
NODAL SOLUTION  
STEP=1  
SUB =1  
TIME=1  
UX      (AVG)  
RSYS=0  
PowerGraphics  
EFACET=1  
AVRES=Mat  
DMX =.110113  
SMN =-.107595  
SMX =.107595  
- .107595  
- .064557  
- .021519  
.021519  
.064557  
.107595
```

$U_x$

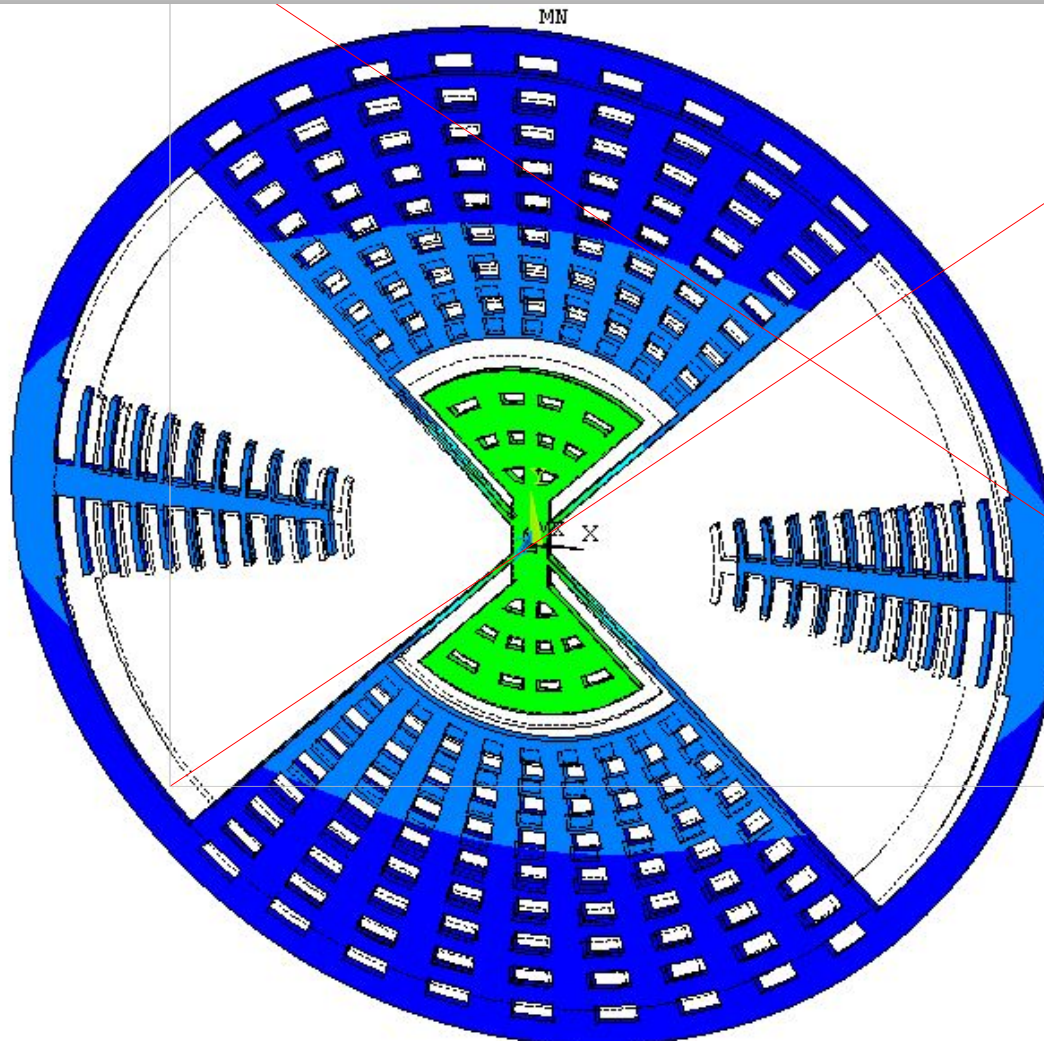
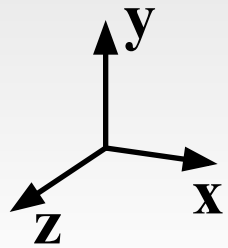
# Finite element modeling and modal analysis of micromechanical gyroscope sensitive element

## Displacements $U_y$



# Finite element modeling and modal analysis of micromechanical gyroscope sensitive element

## Displacements $U_z$



```
NODAL SOLUTION  
STEP=1  
SUB =1  
TIME=1  
UZ      (AVG)  
RSYS=0  
PowerGraphics  
EFACET=1  
AVRES=Mat  
DMX = .110113  
SMN = -.027966  
SMX = .002564  
-.027966  
-.02186  
-.015754  
-.009648  
-.003542  
.0
```

**$U_z$**

# Finite element modeling and modal analysis of micromechanical gyroscope sensitive element

## Influence of deformed state arising at sensitive element manufacturing on a spectrum of natural frequencies

	without account of deformed state	with account of deformed state ( $T = 20^{\circ}\text{C}$ )
1 <sup>st</sup> natural frequency	$F_1$	$0.994^* F_1$
2 <sup>nd</sup> natural frequency	$F_2$	$0.995^* F_2$