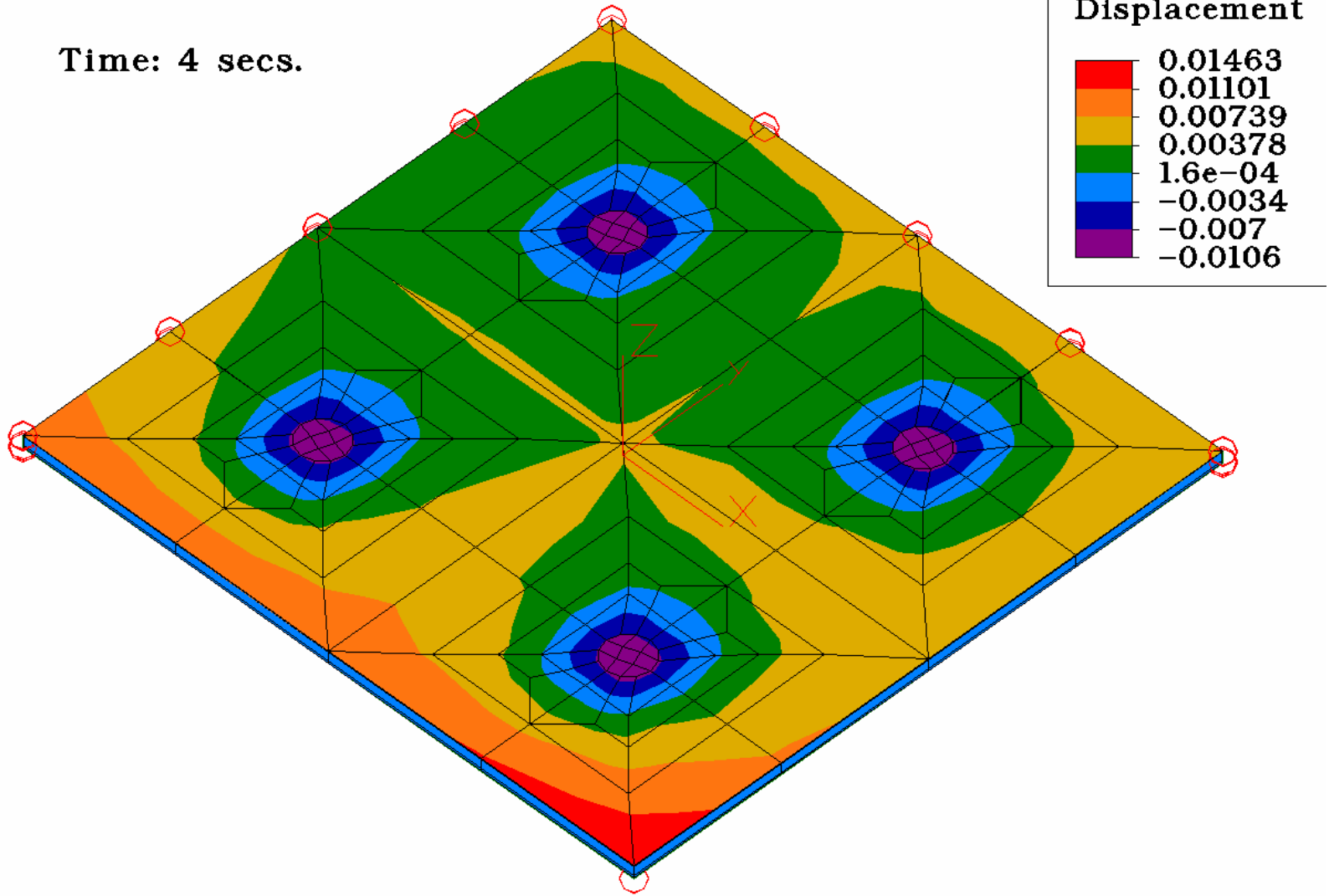


LCFI FEA Study

By

Stephanie Yang

Time: 4 secs.



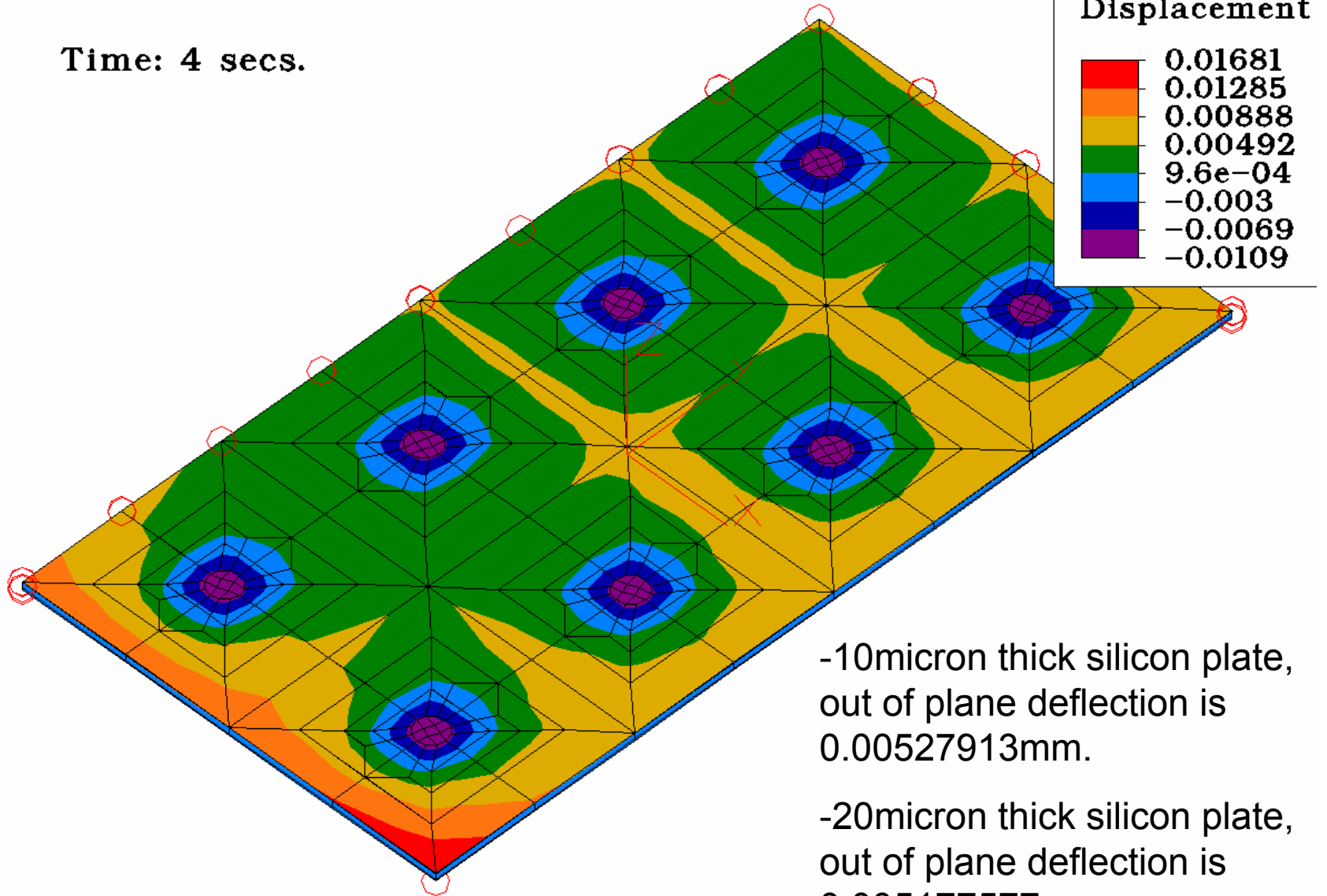
1/16 model

6.75mmx7mm
26-Sep-02

The silicon's maximum out of plane deflection varies with different thickness:-

Thickness mm	Out of plane deflection mm
0.0100	0.00463918
0.0200	0.00386795
0.0300	-0.000170606
0.0500	-0.00013549

Time: 4 secs.



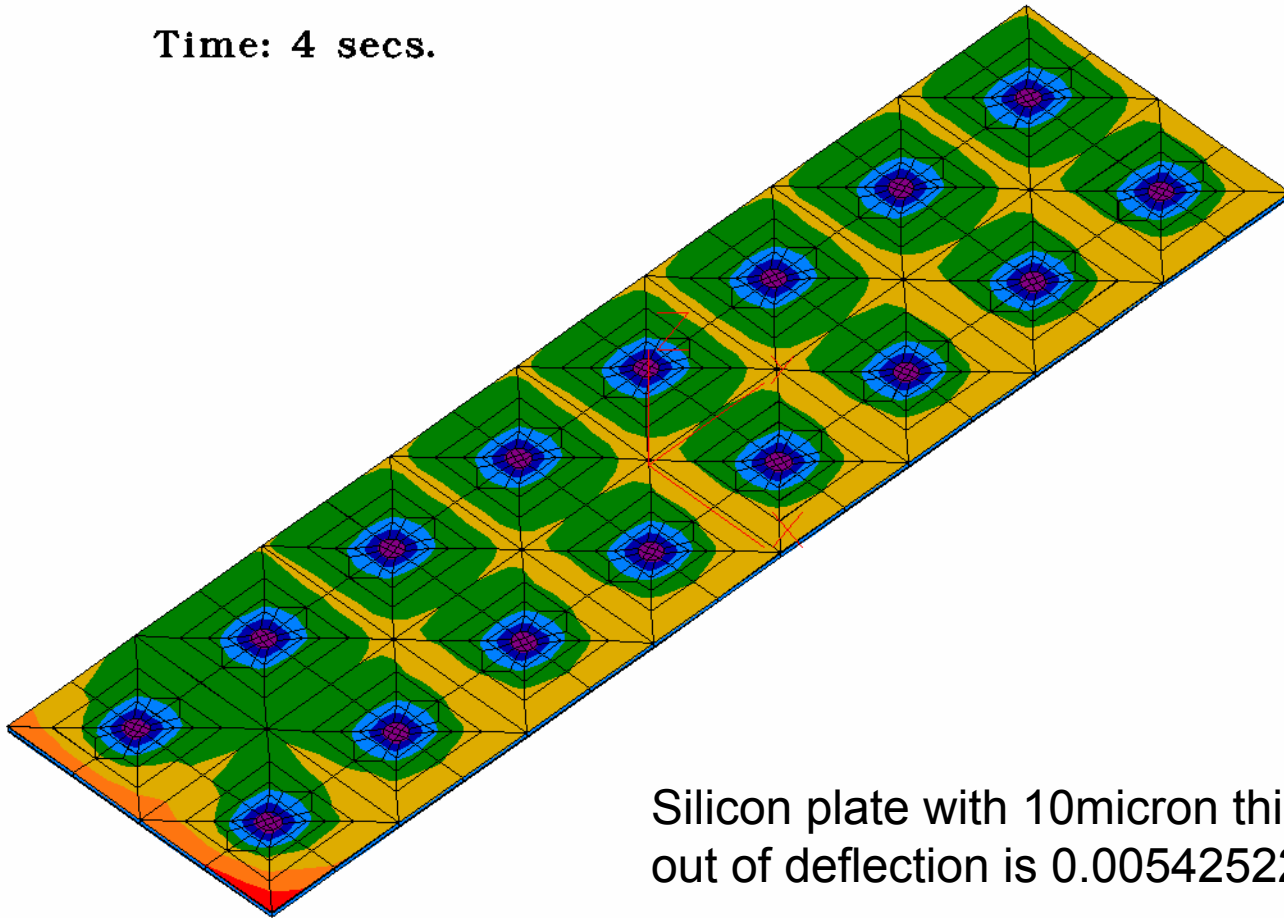
-10micron thick silicon plate,
out of plane deflection is
0.00527913mm.

-20micron thick silicon plate,
out of plane deflection is
0.005177577mm.

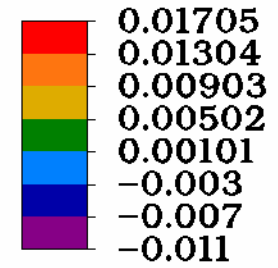
1/8 model

26-Sep-02

Time: 4 secs.



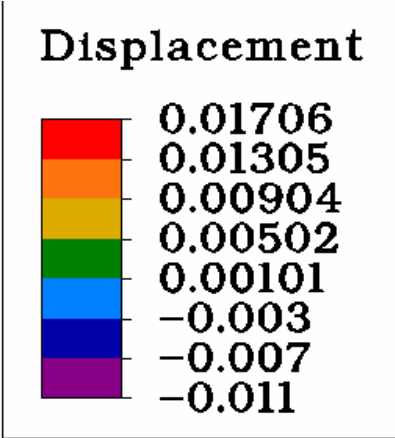
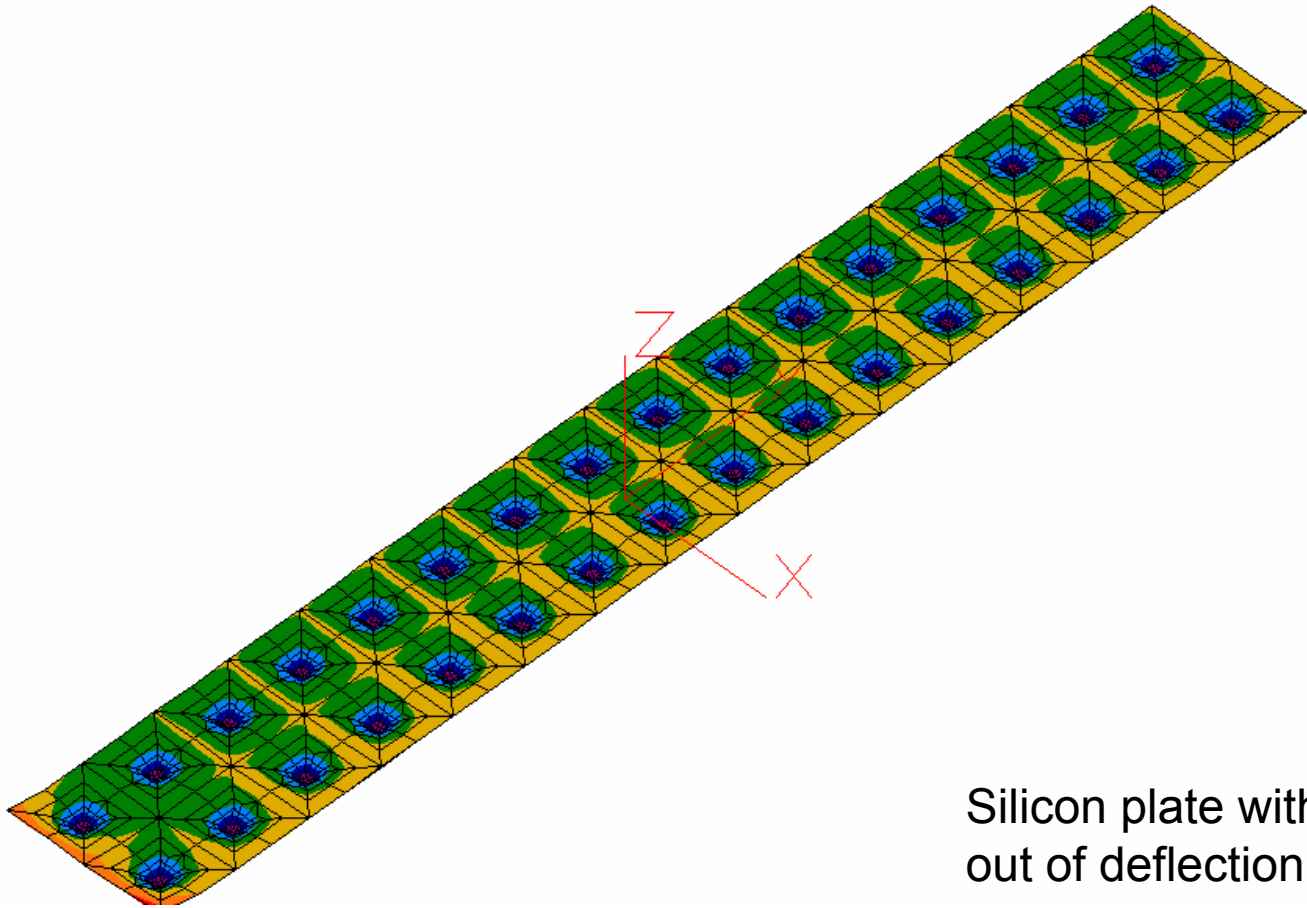
Displacement



Silicon plate with 10micron thick, the
out of deflection is 0.00542522mm

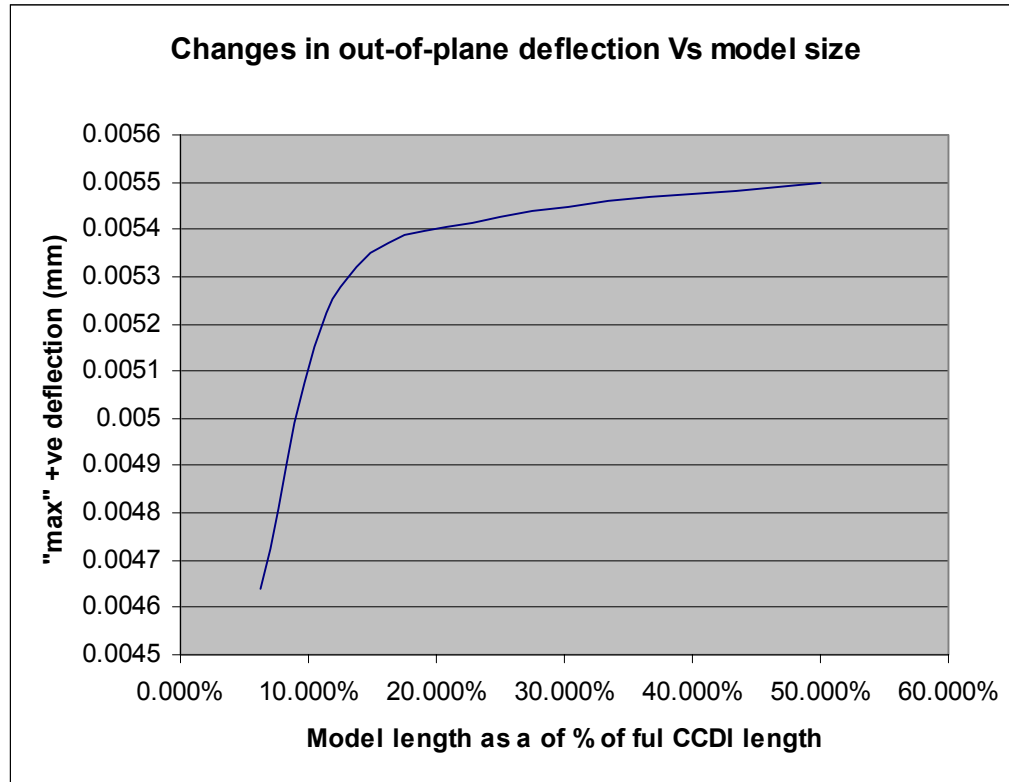
1/4 model

Time: 4 secs.

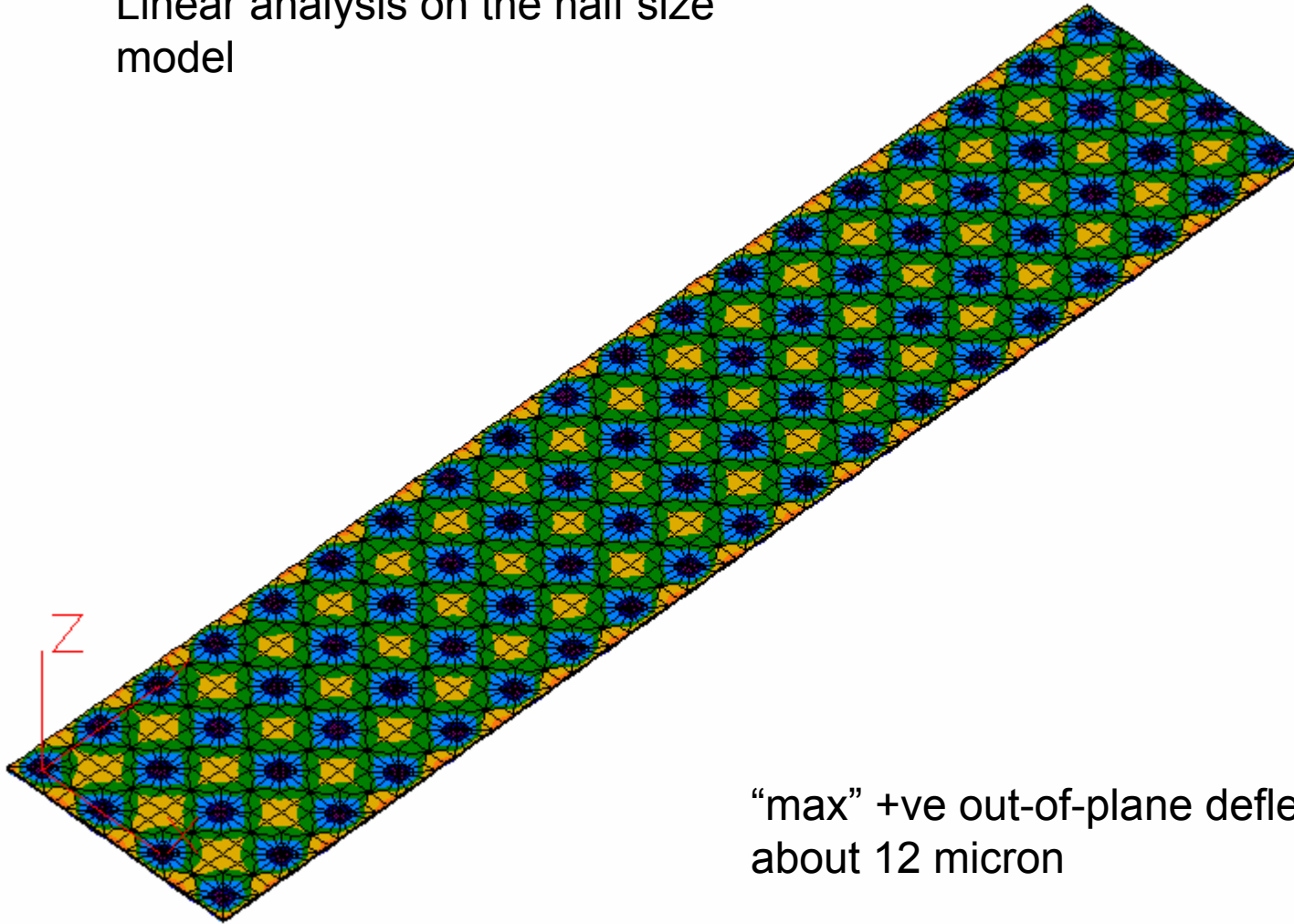


Silicon plate with 10micron thick, the out of deflection is 0.0055mm

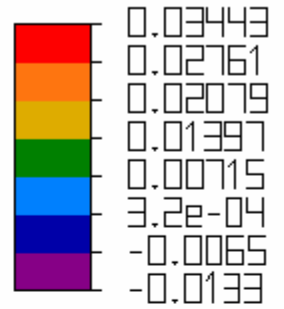
1/2 length model



Linear analysis on the half size model



Displacement



“max” +ve out-of-plane deflection is about 12 micron

Observation of results:

From the non-linear runs:

A number of different model sizes, at half width by making use of the plane of symmetry, were looked at. They ranged from 1/16 to 1/2 of the full length of the CCD;

The results show that the fuller the size, the more accurate is the result;

The max. out-of-plane deflection is about 5.5 microns;

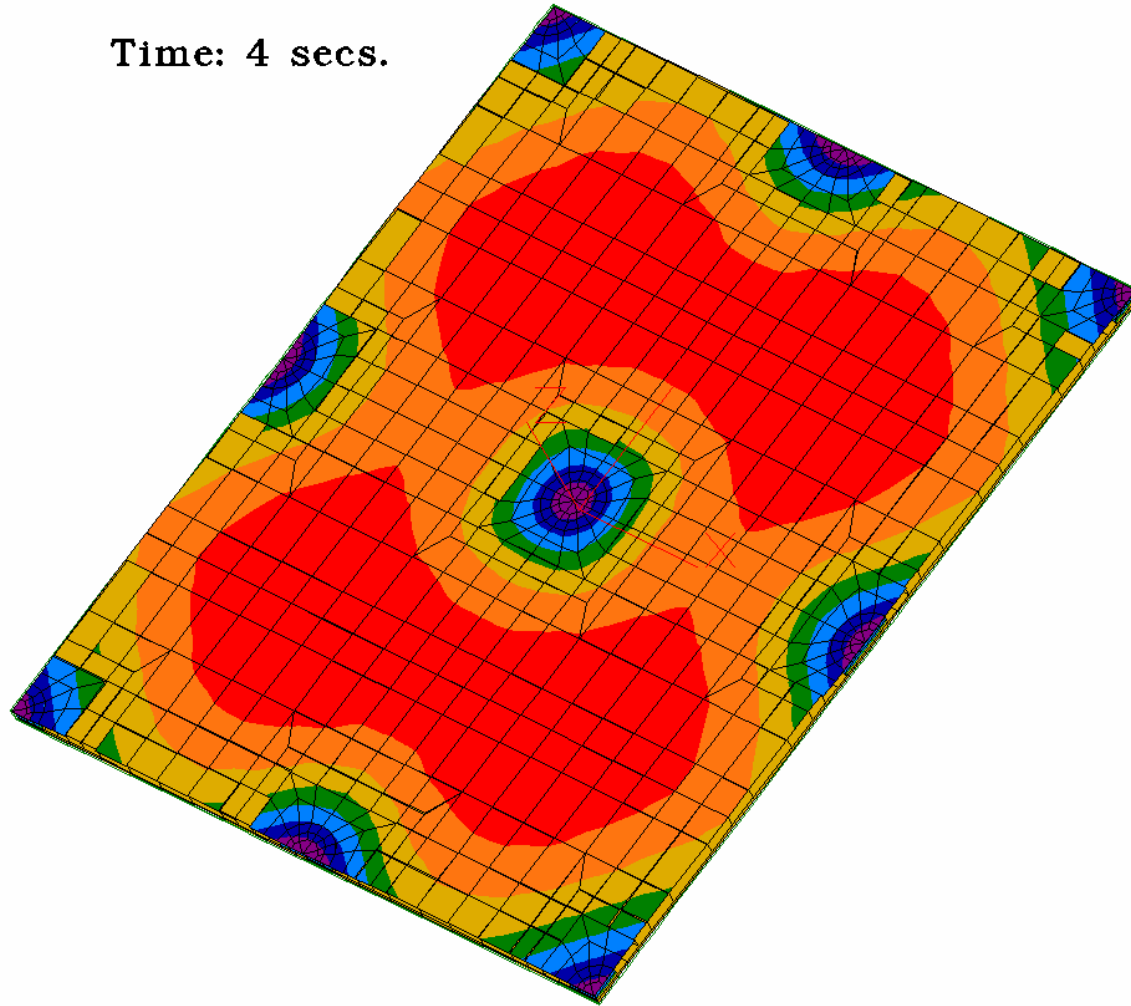
It can be deduced from the results would converge if the model is at least a quarter of the length of the full model.

From the Linear runs:

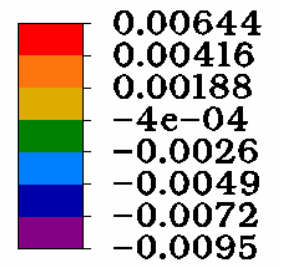
The same model size, but with full width, shows a max out-of-plane deflection of about 12 micron

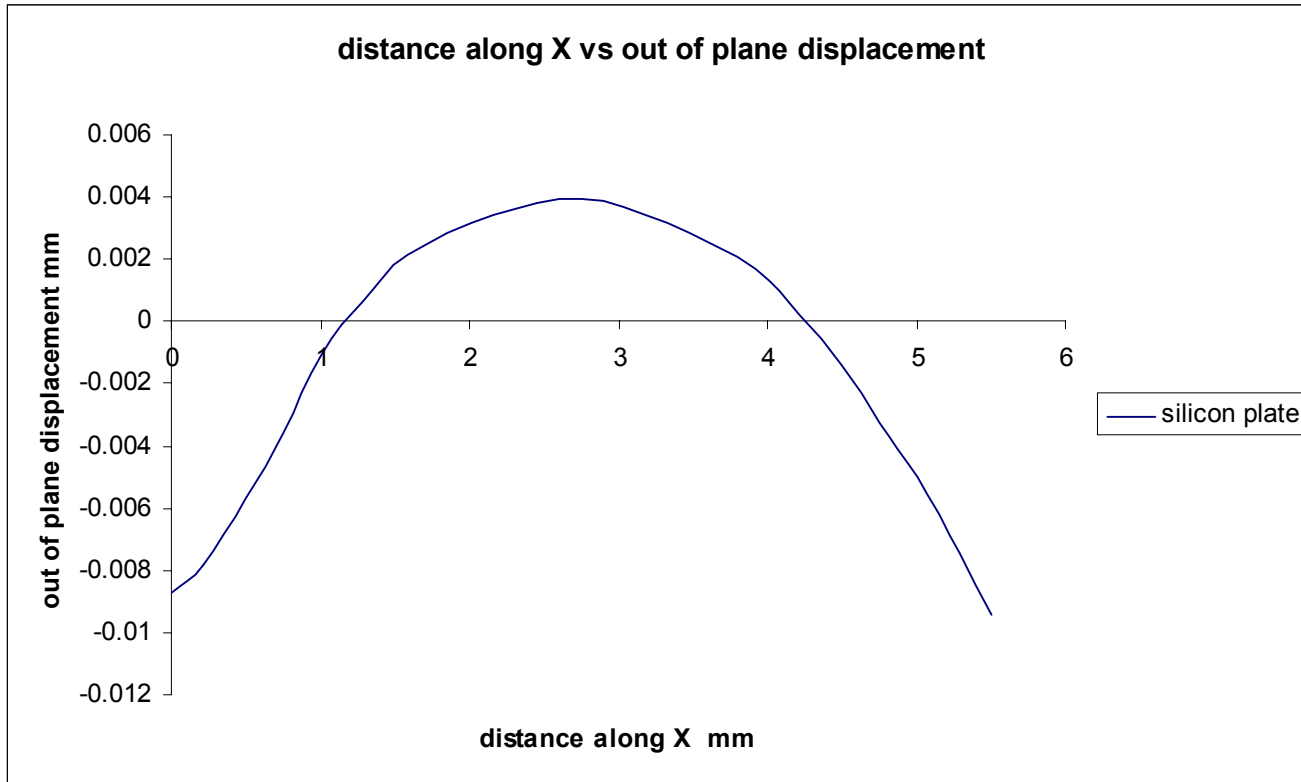
It seems that the linear run tends to over estimate the deflection by nearly 100%.

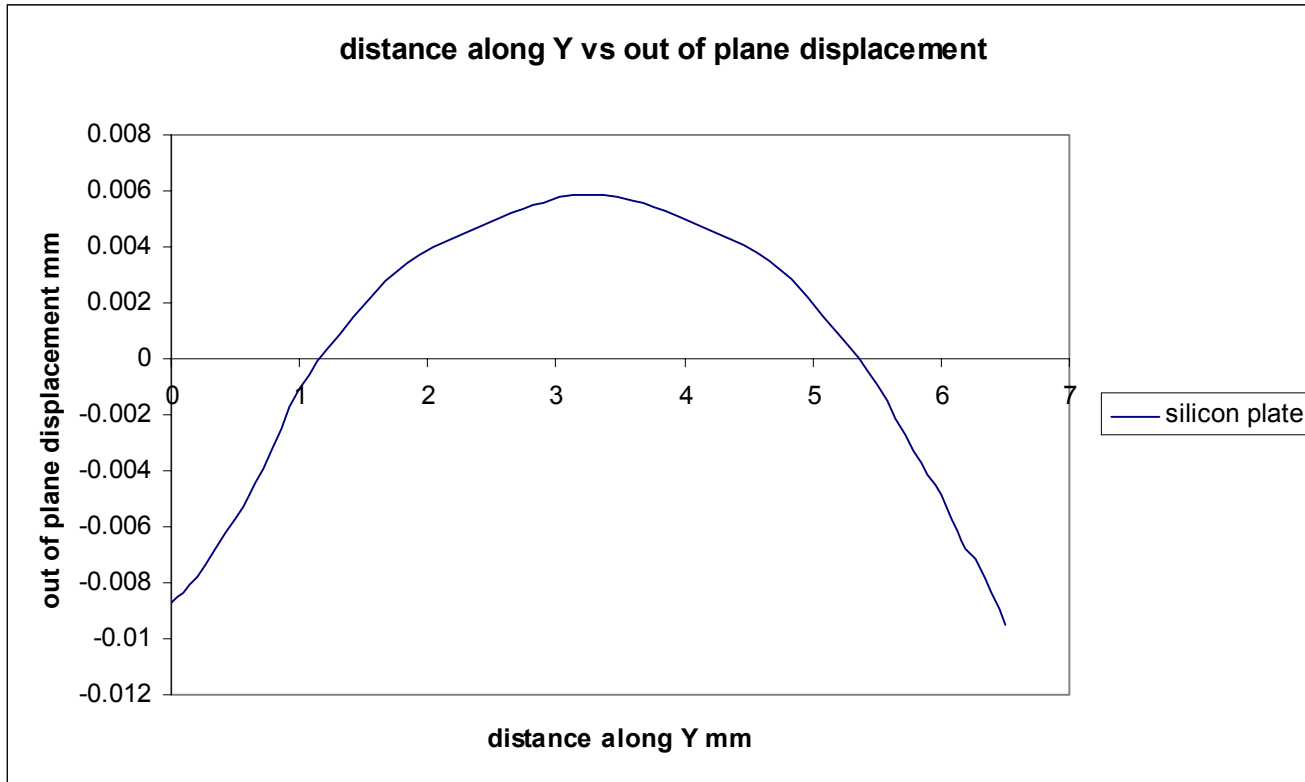
Time: 4 secs.



Displacement

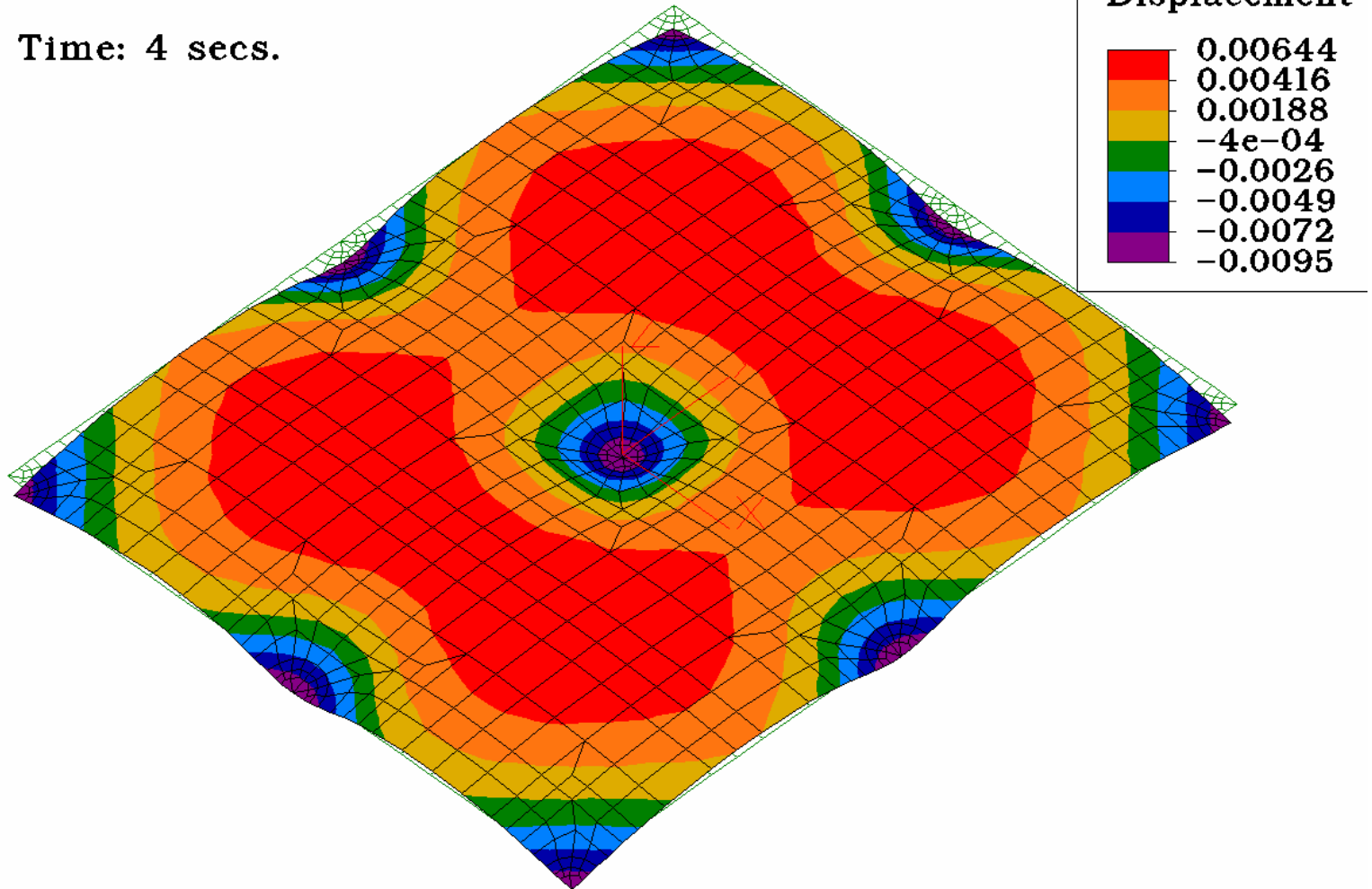






Unit: mm

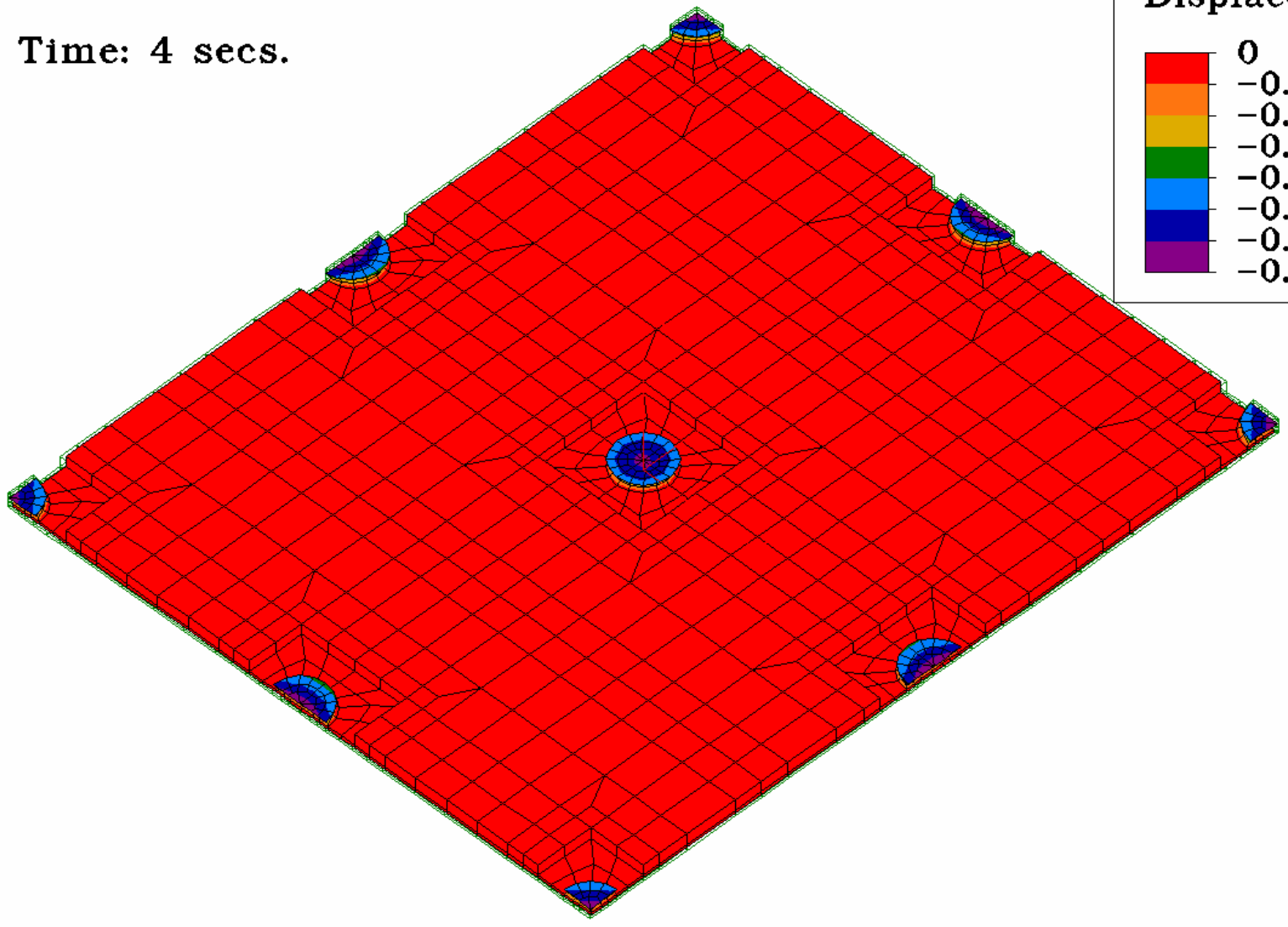
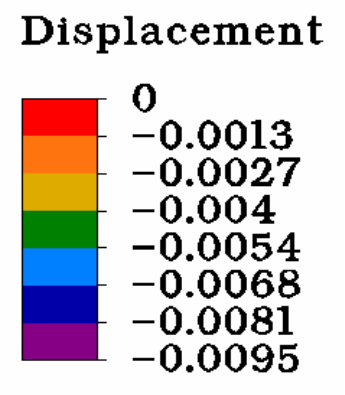
Time: 4 secs.



Silicon plate with the thickness of 0.02mm

26 Sep 02

Time: 4 secs.



Beryllium & glue
26 Sep 02

Importance of choosing the right glue pattern for a small model

The above model which has one full size glue, but many half or quarter neighbouring glues tends to over-estimate the +ve deflection by about 10%.

This is due to the free edge effect caused by the partial glues at the edges.

The above shows that if a small model is to be selected for whatever reason, it pays to have one with at least 4 full size glue, like the one shown at the beginning of this presentation.