



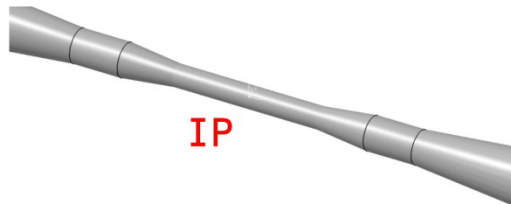
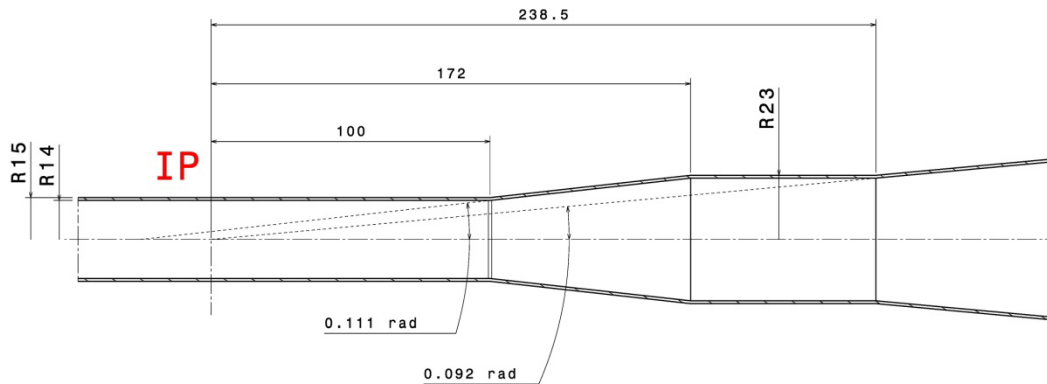
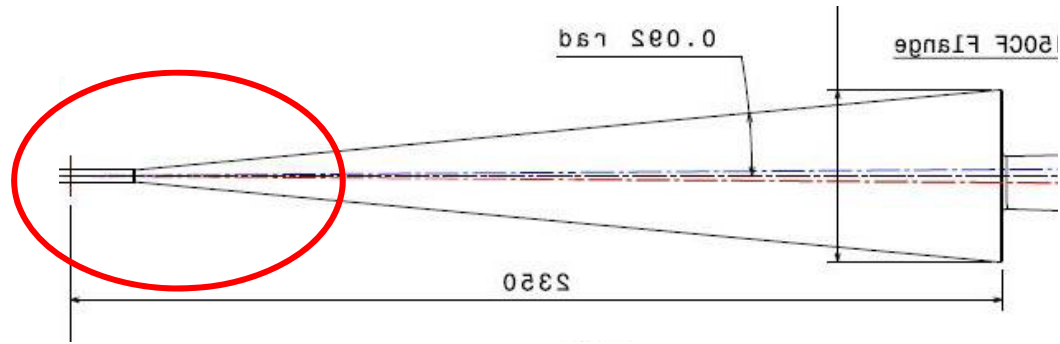
Estimation of Wake Field, Heating in Modified Beam Pipe

Y. Suetsugu, KEK

- Loss factor
- Structural strength

- Modified Model

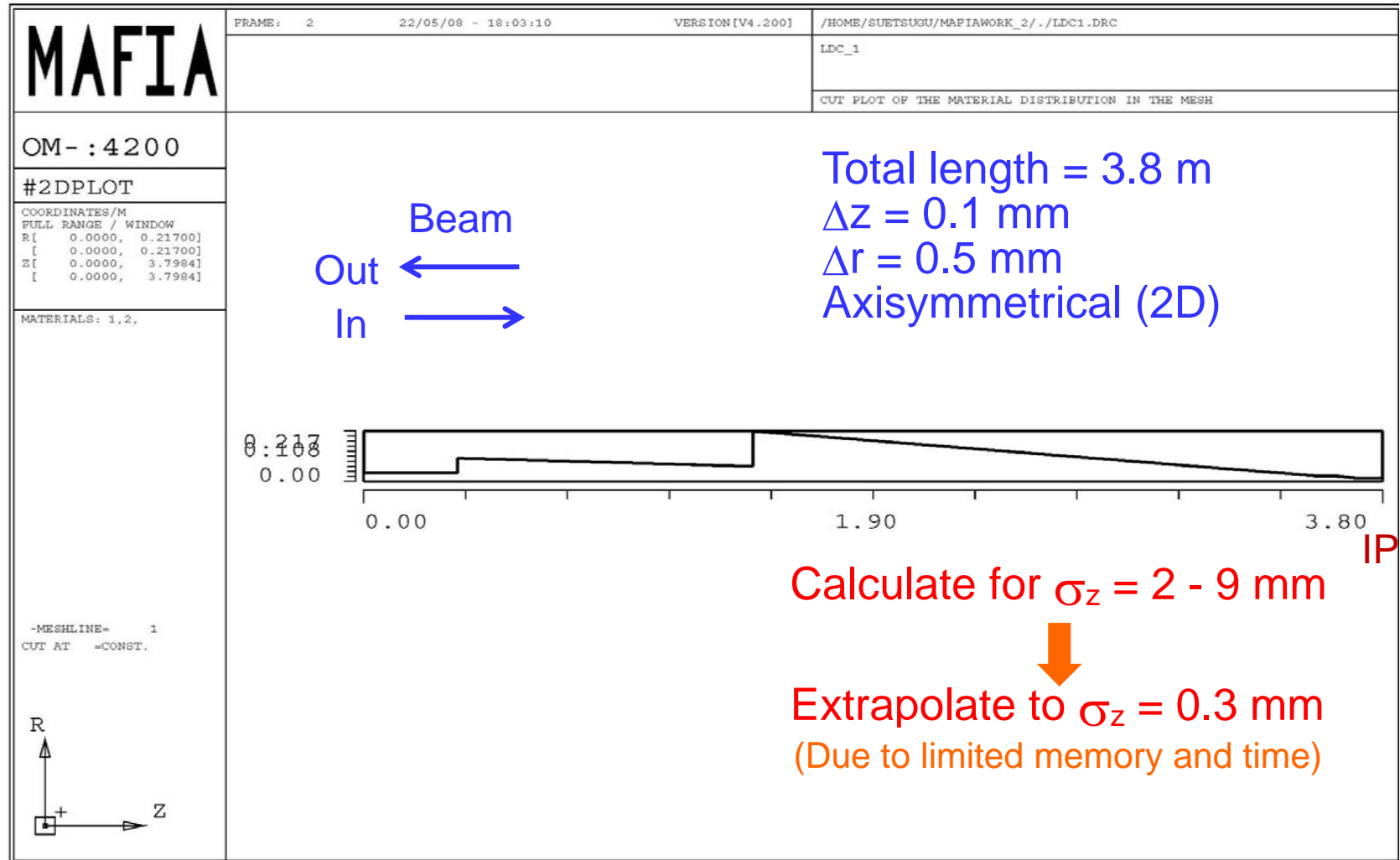
With step



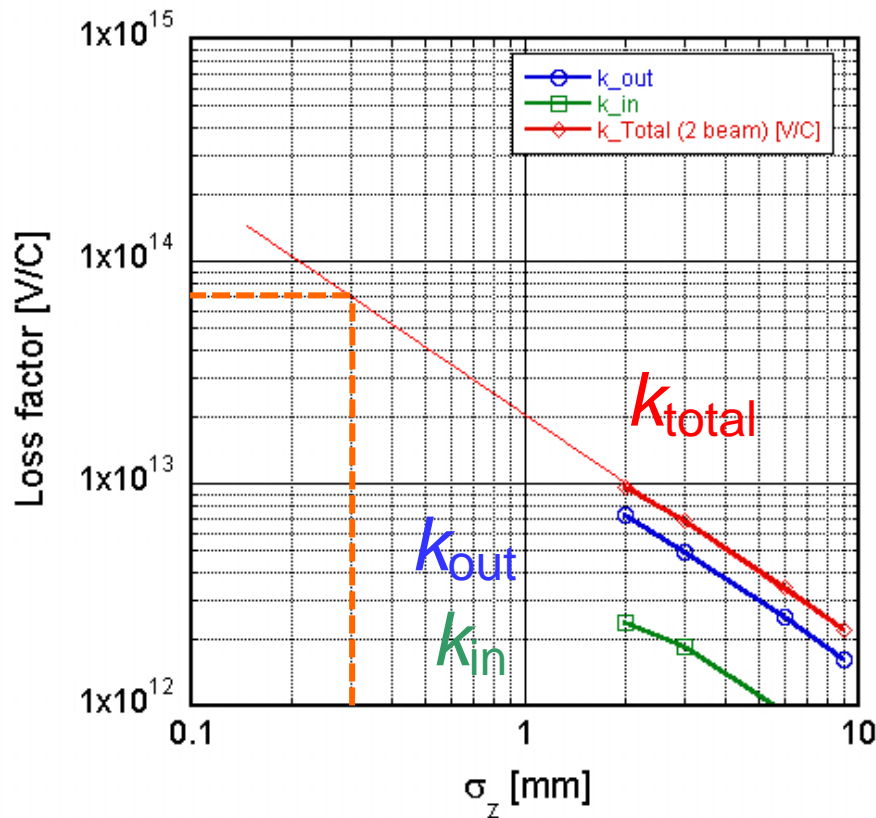
Calculations similar to those of TILC08 were performed.

Base de données : IDsmt_3D : 23971		Date	14/04/01
Traitement :		Protection :	
Matière :	Tolérances générales	± 0,1	Rugosité générale Ra 3,2 (N)
ILD			
Beam pipe in IP area			
Indice	Date	Modifications	D
Dessiné par : M. JORE			4

- Model for calculation



- Results



k_{in} and k_{out} is different, since the apertures at both ends are different.

k_{total} (two beams) $\sim 7 \times 10^{13}$ V/C
@ $\sigma_z = 0.3$ mm

If $q = 3.2$ nC, $N_b = 5400$ bunch,
and $f_r = 5$ Hz : $I = 8.6 \times 10^{-5}$ A

$\therefore P = kql = \sim 20$ W (one side)

Almost the same to
the result for LDC-1



- Comparison
 - $\sigma_z = 3$ mm
 - Two beams

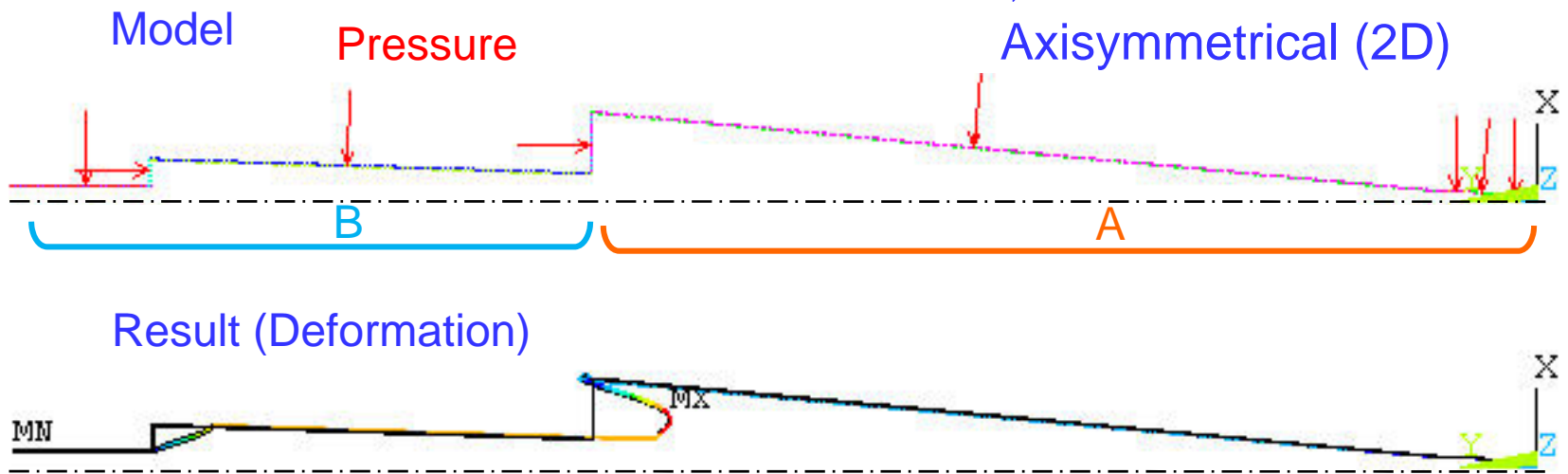
Type	Loss factor (k_{total})	Ratio
LDC-1	6.81731×10^{12}	100%
LDC-1_mod	6.79690×10^{12}	99.7%
LDC-2	6.71416×10^{12}	98.5%
LDC-3	6.68828×10^{12}	98.1%

No effect on the loss factor

- Deformation and stress

- Material: **Al alloy (Al5052, H34)**
- Thickness **A: 1 mm, B: 3 mm**
- Load: **Atmospheric pressure (1.013×10^5 Pa)**
- **By ANSYS**

Total length = 3.8 m
 $E = 7.056 \times 10^{10}$ N/m²
 $\nu = 0.3$
 Axisymmetrical (2D)

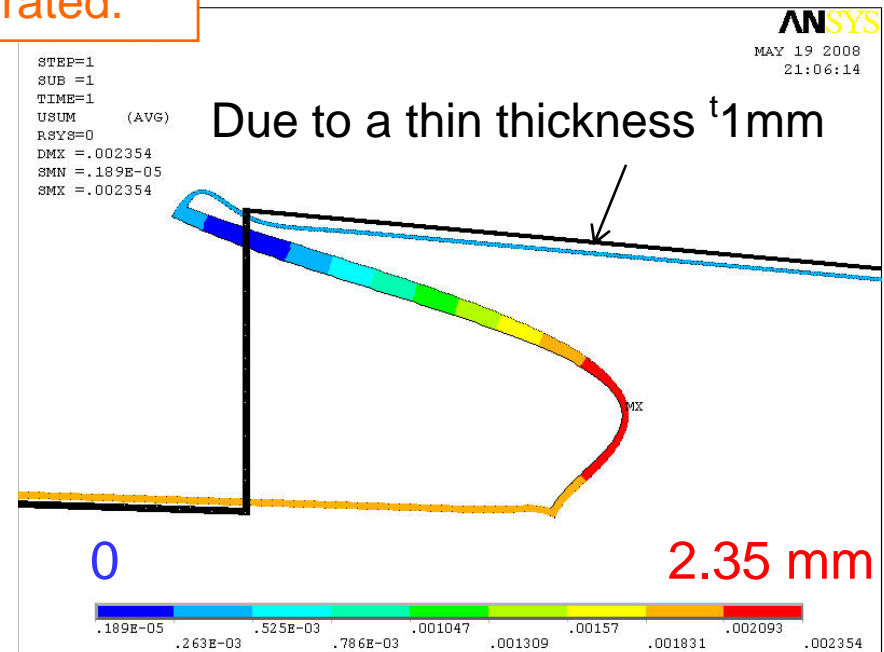
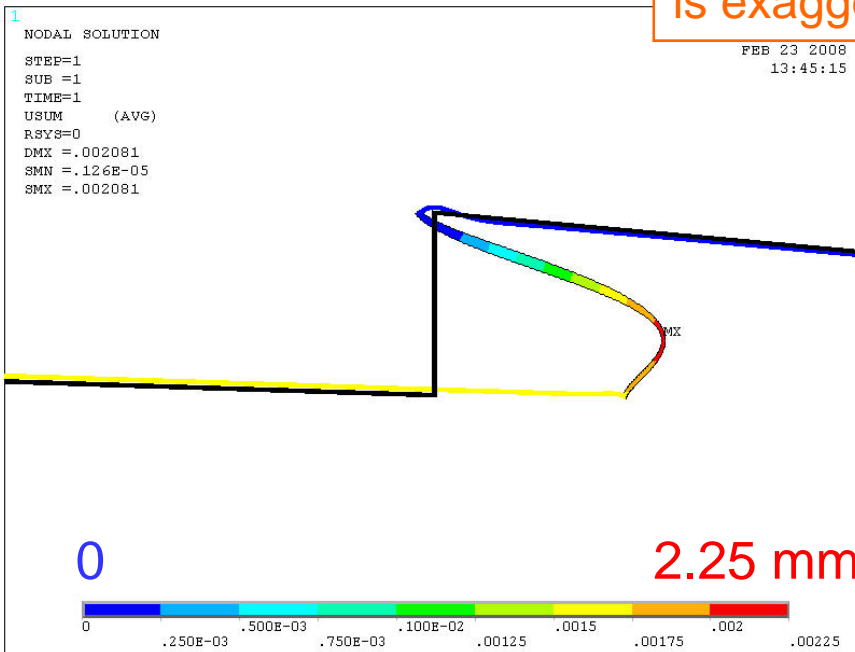


- Result: Deformation

LDC_1

Deformed shape is exaggerated.

Modified

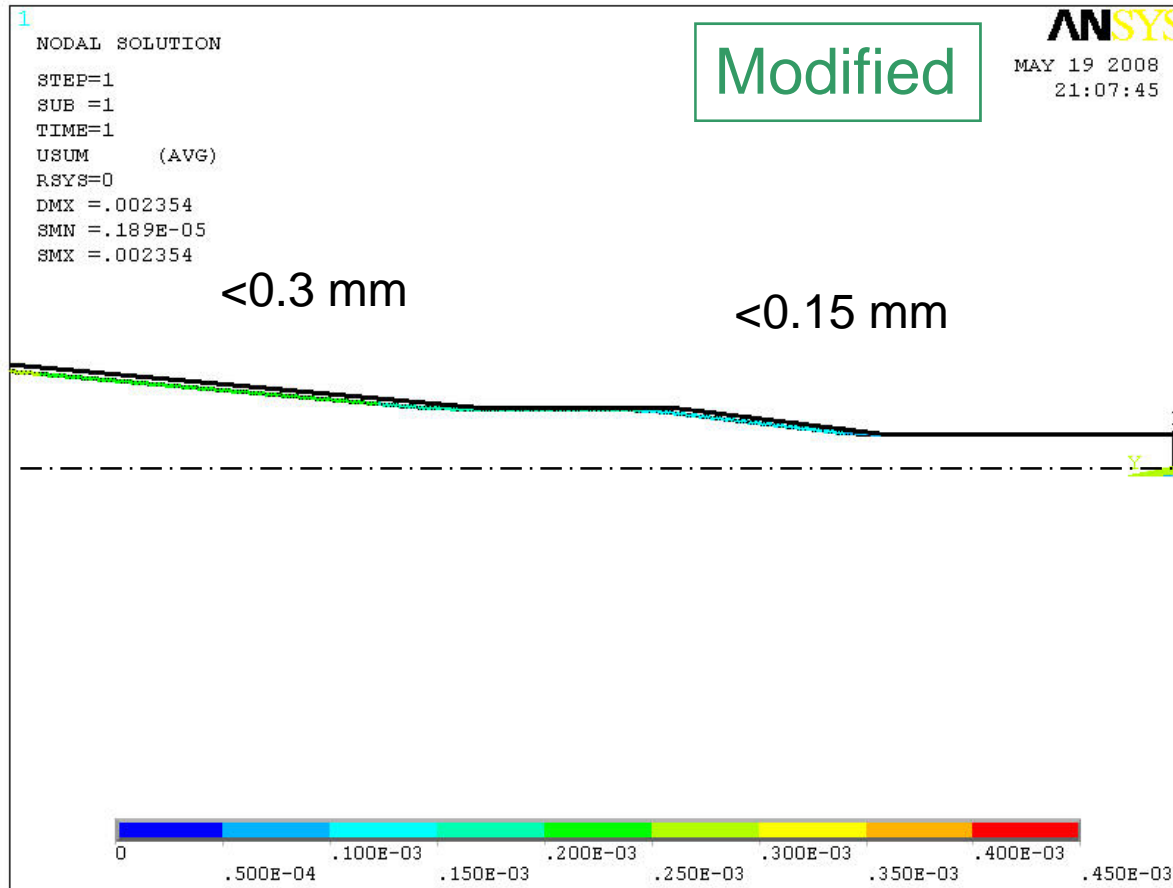


Deformation is a little bit large, but almost the same.



Structural strength

- Result: Deformation (near IP)



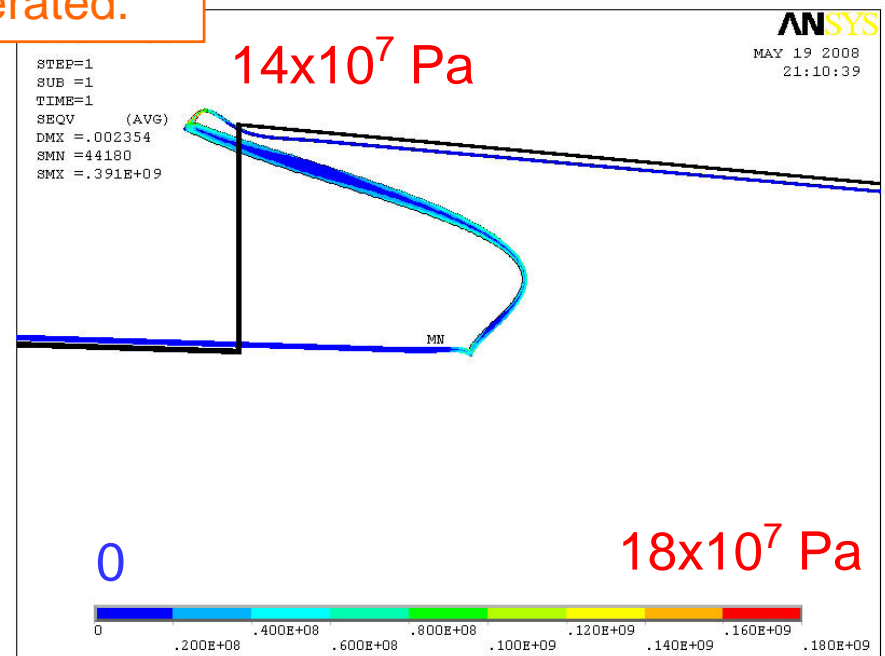
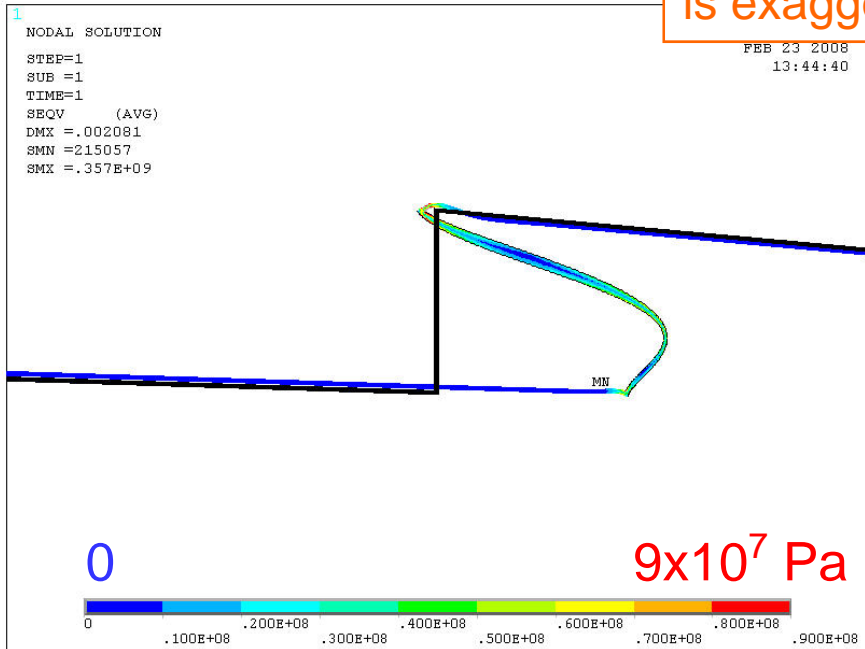
Deformed shape is exaggerated.

- Result: Stress (Von Mises stress)

LDC_1

Deformed shape is exaggerated.

Modified

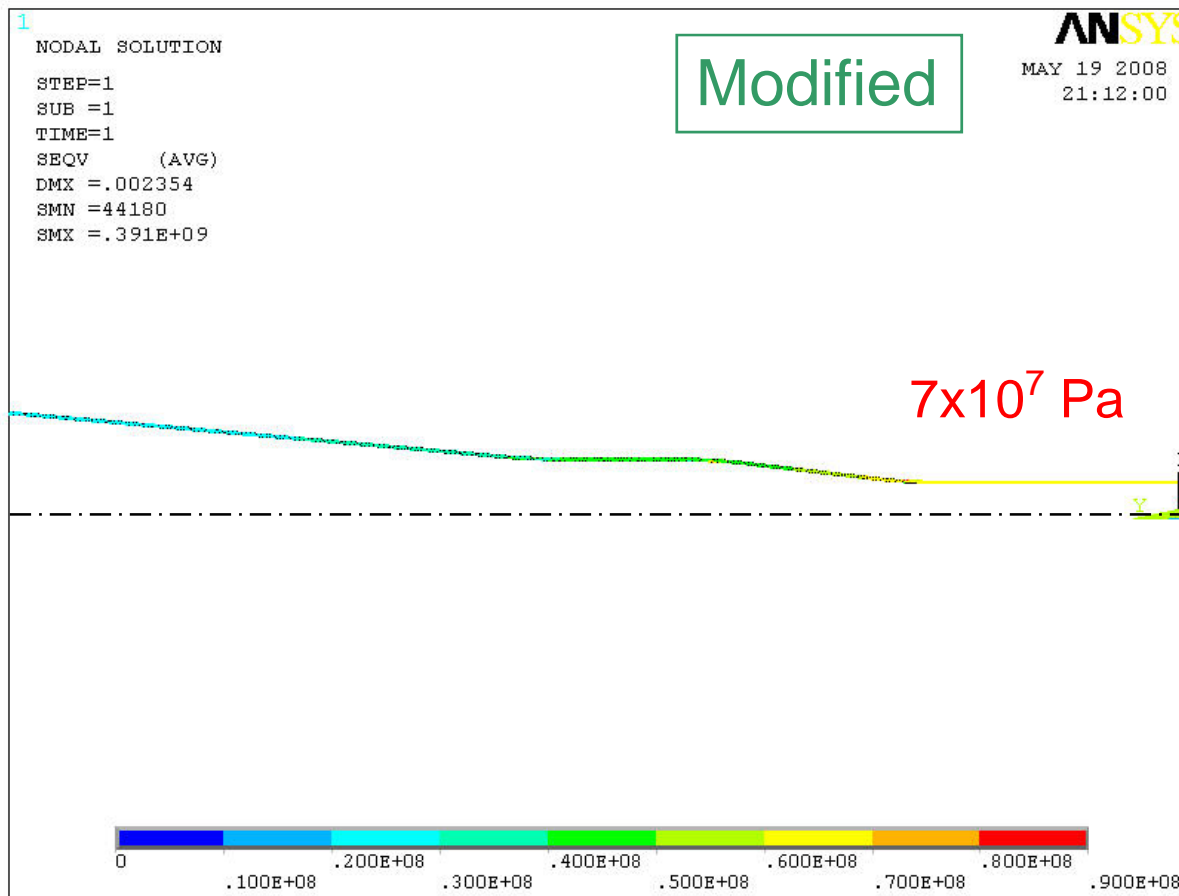


(Yield strength of aluminum alloy is 22×10^7 Pa)
Be careful about the welding at the edge. 1mm?



Structural strength

- Result: Stress (Von Mises stress)(near IP)



Deformed shape is exaggerated.

May be no problem

Calculation for actual Be is required.

- The modification has little effect on:
 - **Loss factor**
 - **Structural strength**
 - **Pressure profile**
- For further consideration:
 - **Calculation using real material properties is required.**
 - **Insertion of bellows? (possible? how?)**
 - **How to fix (support) chambers?**