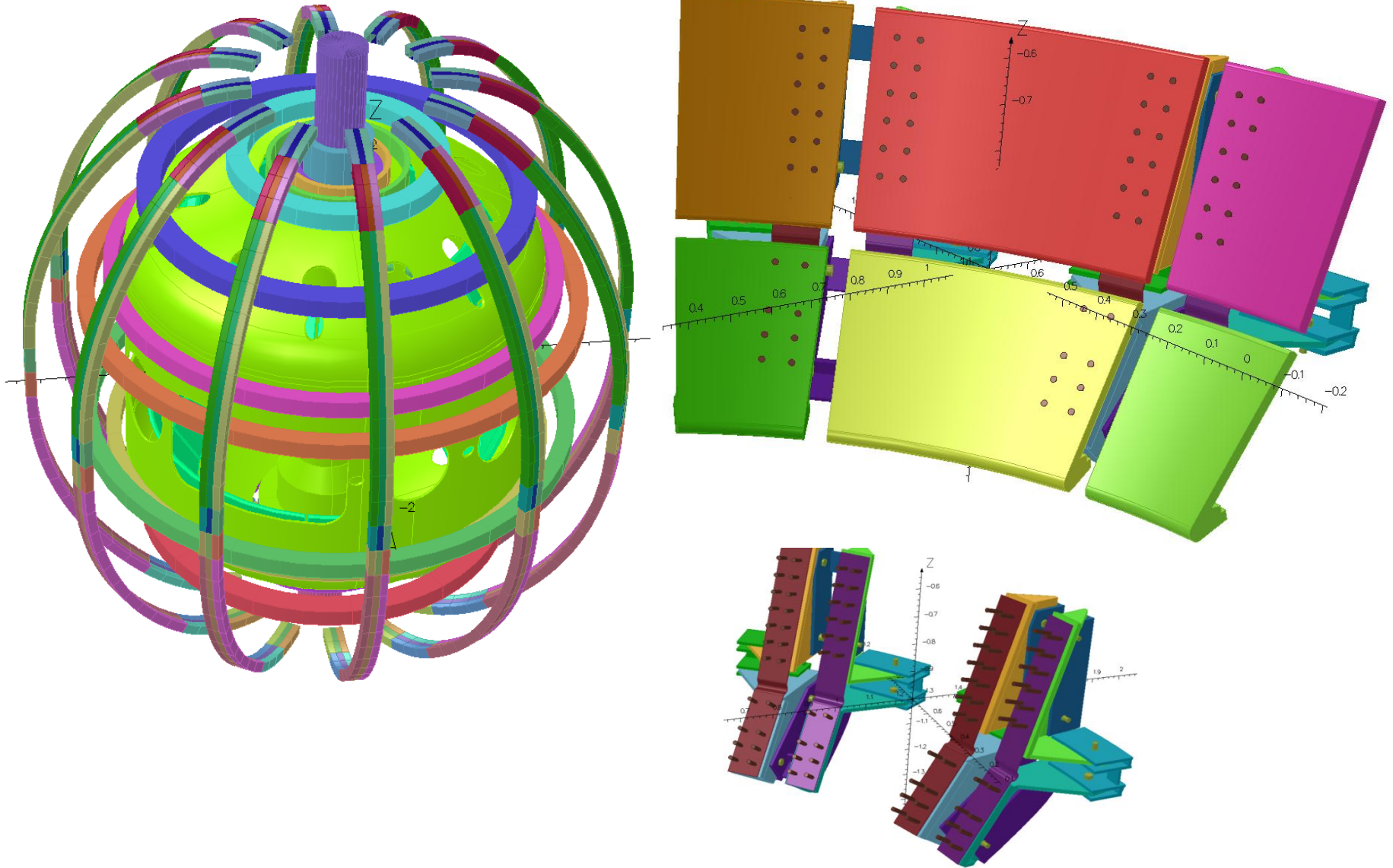
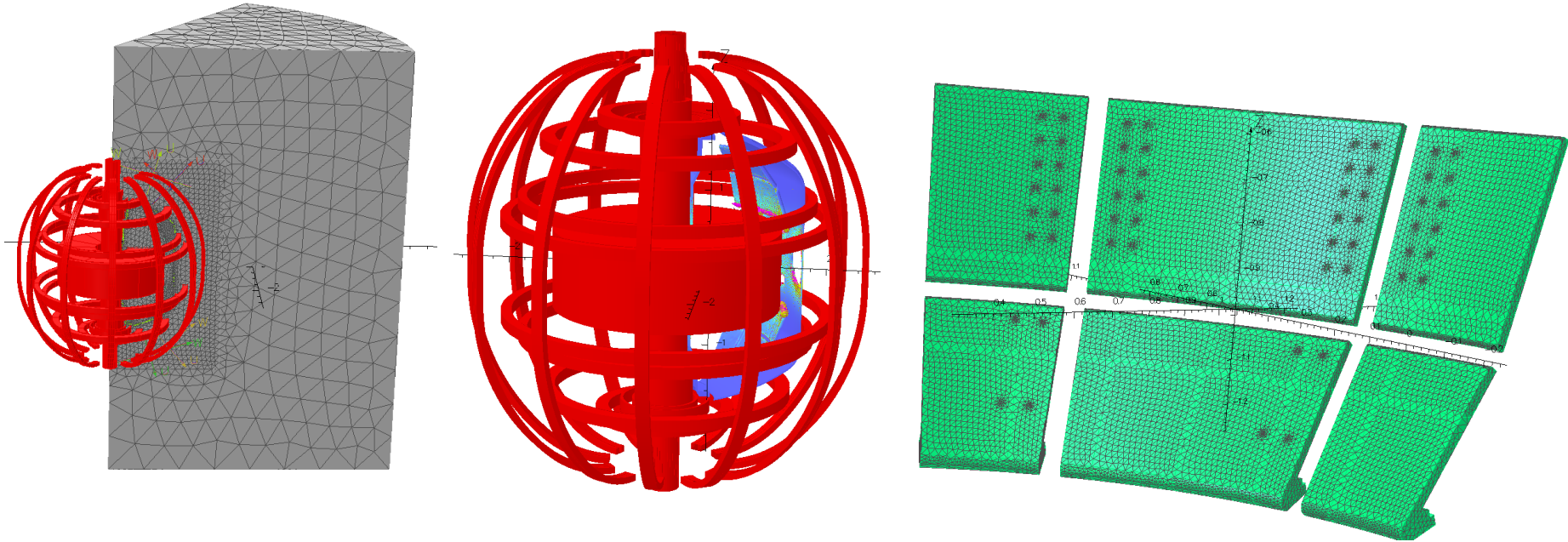


Disruption Analysis of PP, VV, and Components



Model includes bracket conducting path on back of PPs

Opera 3D Model – Transient ELEKTRA Solver



Square shape plasma (same cross section area as circular shape)

FE Mesh

Fast mid-plane centered disruption 2 MA/ms
Back ground field OH, TF and PF coils (#79)

Plasma current (CC)
PF5 current (CW)

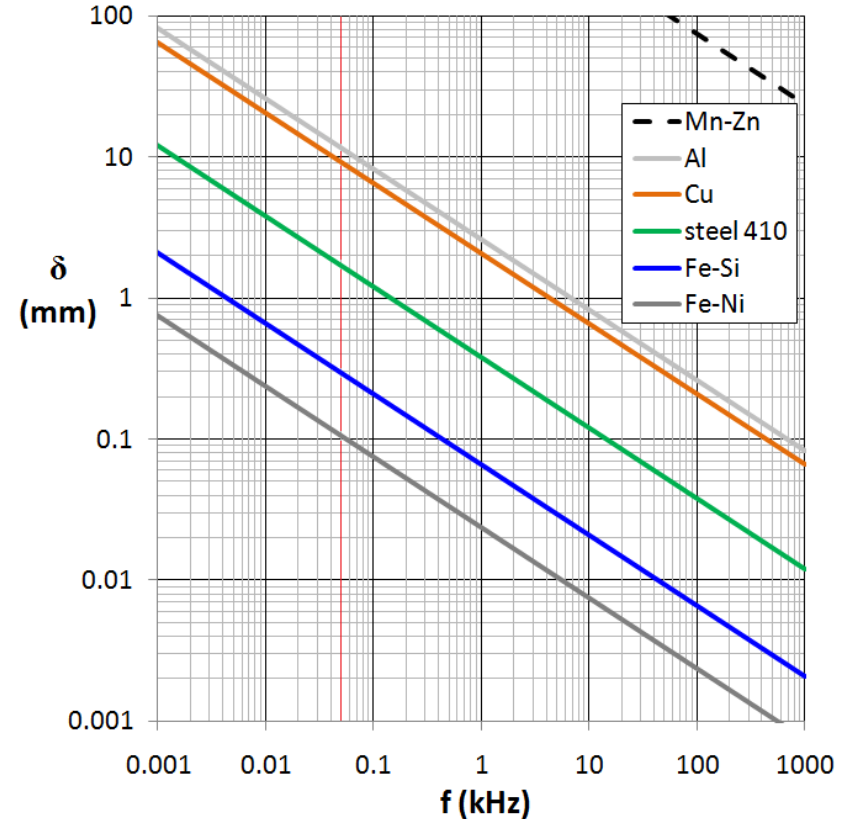
Background fields at center of lower PPPs (1.2, 0.72, -0.8) m

	Br (T)	Bz (T)
Without plasma	0.152	-0.465
With plasma t=0	-0.0265	-0.439
End of disruption	0.038	-0.264

Eddy Current Distribution – Skin Depth

Electrical conductivity and skin depth (1ms disruption)

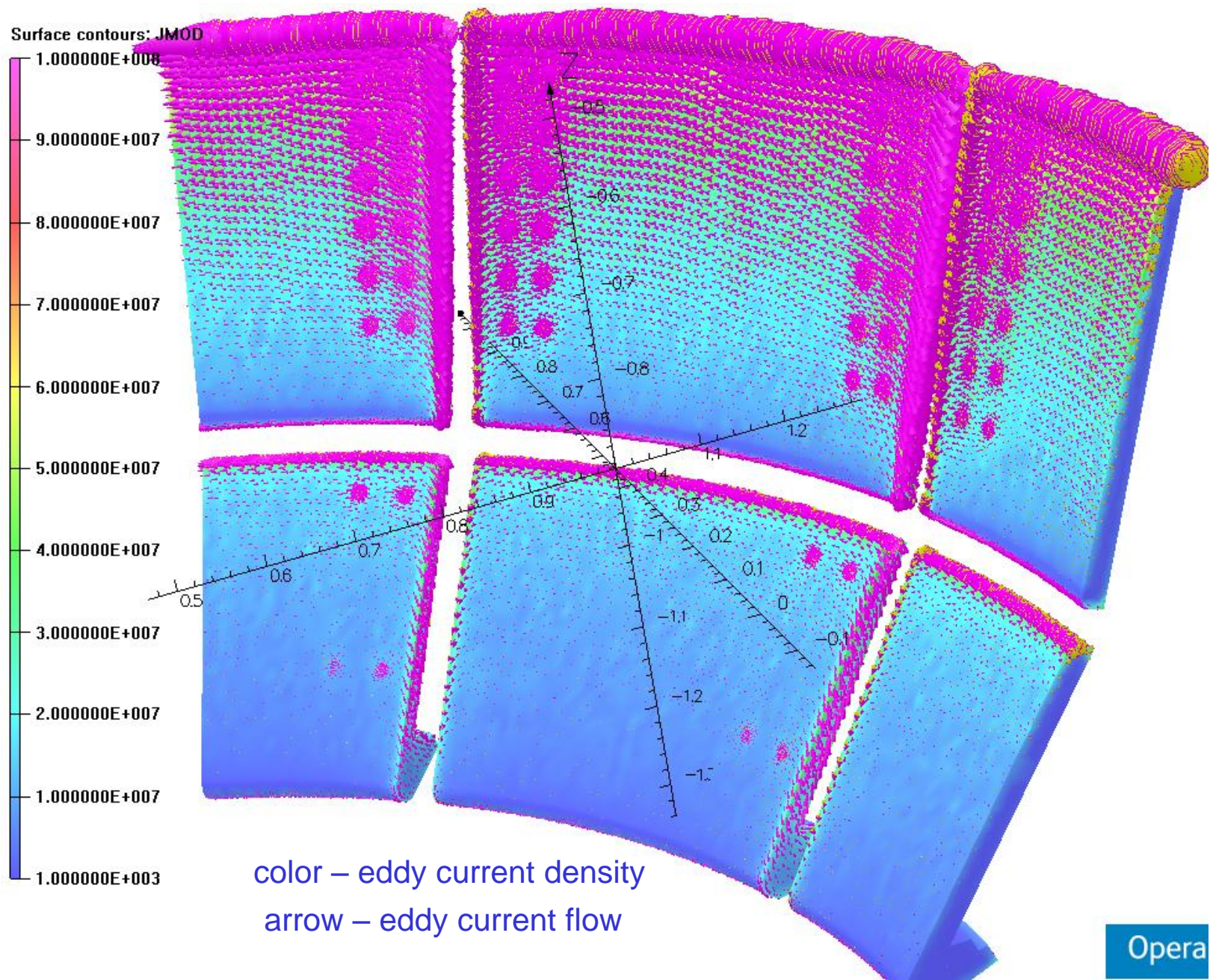
	Conductivity (S/m)	Skin depth
Passive Plate	5.07×10^7 (85% Cu)	2.25 mm
Bracket	1.35×10^6 (SS)	13.7 mm
VV	1.35×10^6 (SS)	13.7 mm
CS Casing	1.35×10^6 (SS)	13.7 mm



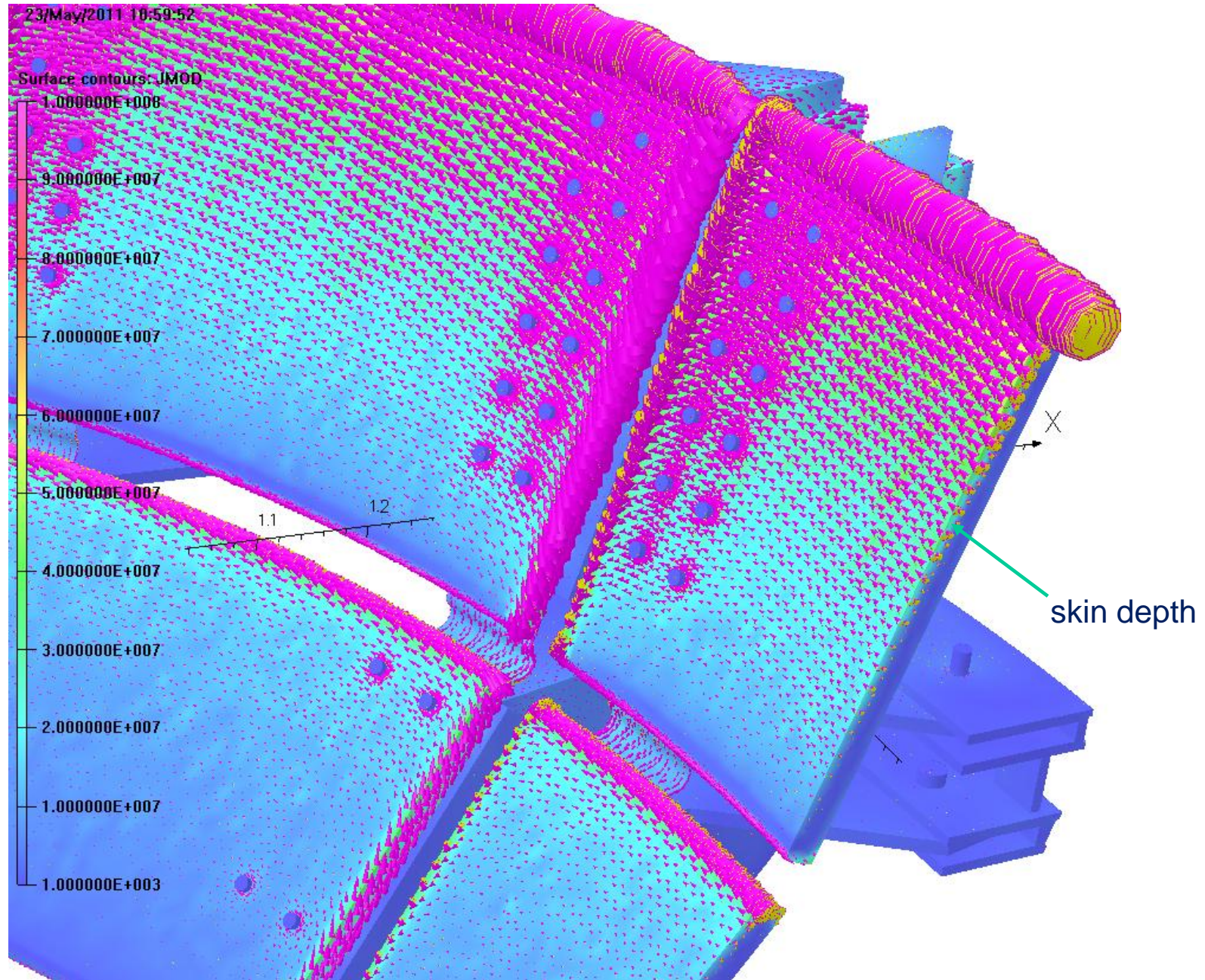
The skin depth of copper passive plates is only ~2-2.5 mm during 1 ms plasma disruption

$$\delta = \sqrt{\frac{2\rho}{\omega\mu}} = \sqrt{\frac{1}{\pi f \sigma \mu}} = \frac{1}{\sqrt{3.14 \times 10^3 \times 4 \times 3.14 \times 10^{-7} \times 5.066 \times 10^7}} = 2.25 \times 10^{-3}$$

Eddy Current Centered Disruption – 60 Degree Model



Eddy Current Centered Disruption – 60 Degree Model



Eddy Current Distribution on Bracket (Back of PPs)

23/May/2011 11:05:34

Surface contours: JMOD

5.000000E+007

4.500000E+007

4.000000E+007

3.500000E+007

3.000000E+007

2.500000E+007

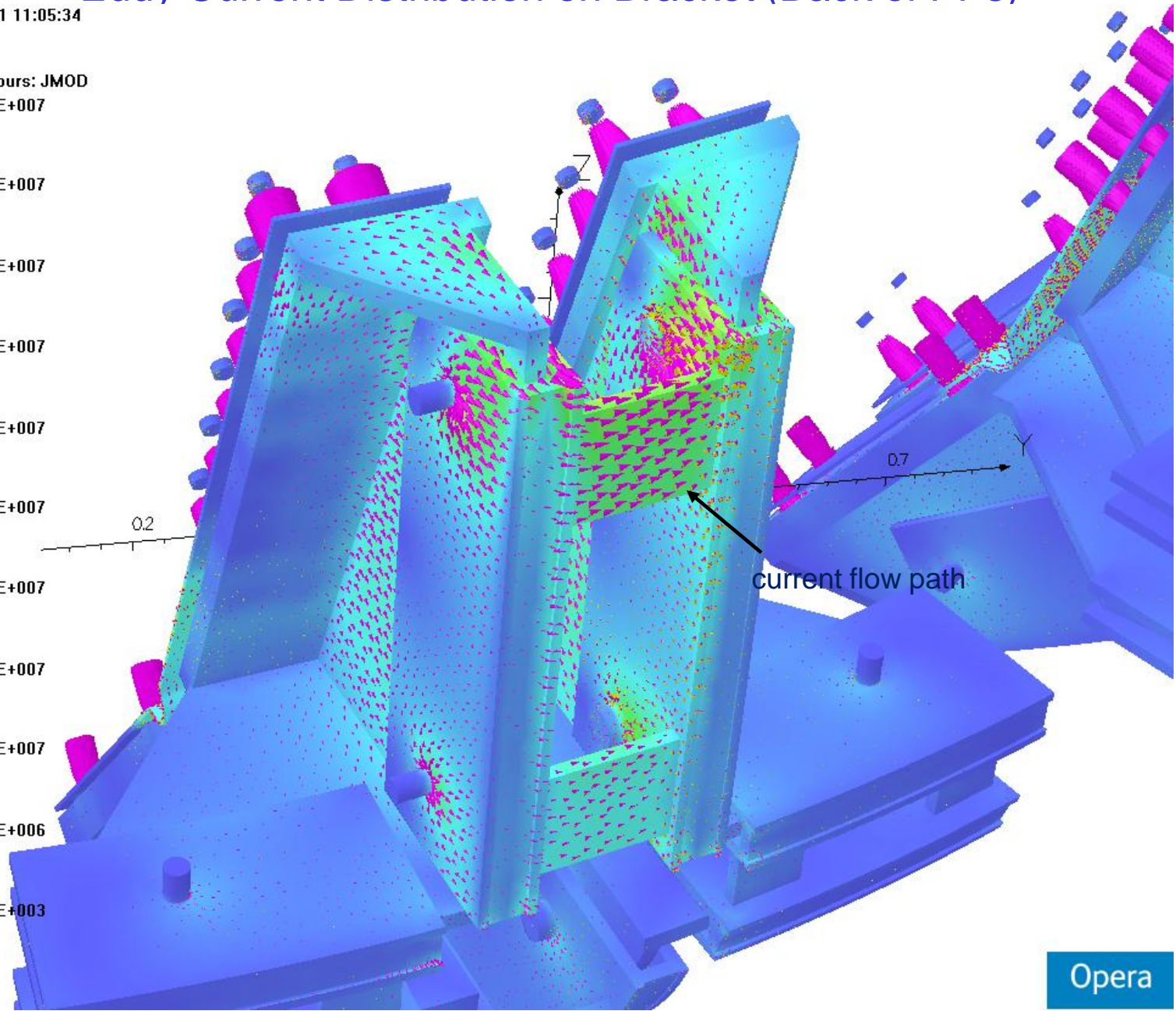
2.000000E+007

1.500000E+007

1.000000E+007

5.000000E+006

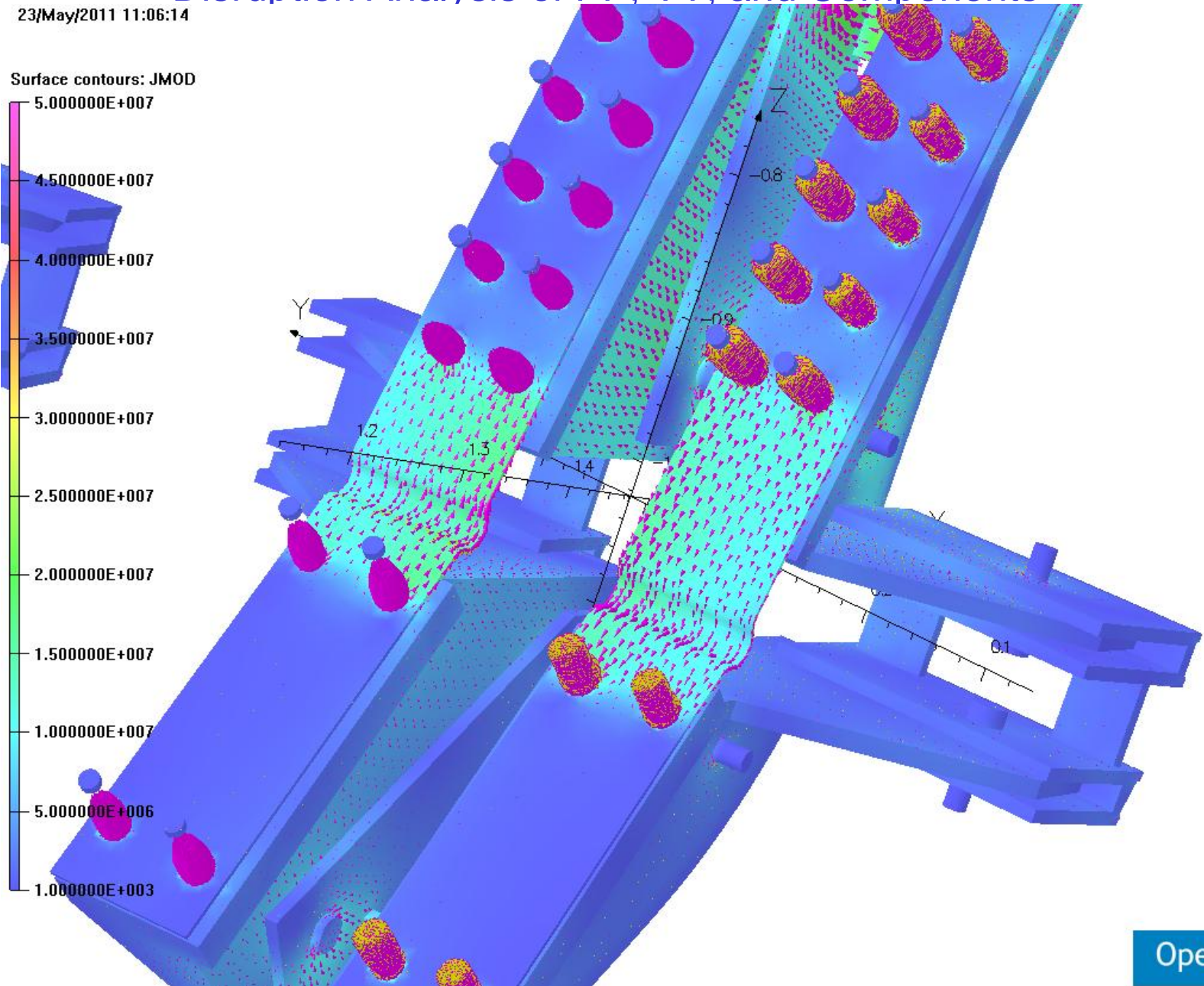
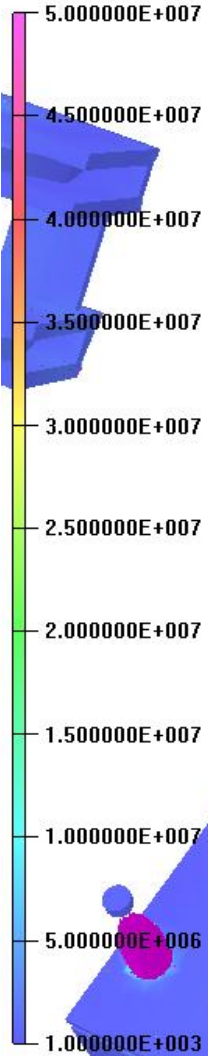
1.000000E+003



Disruption Analysis of PP, VV, and Components

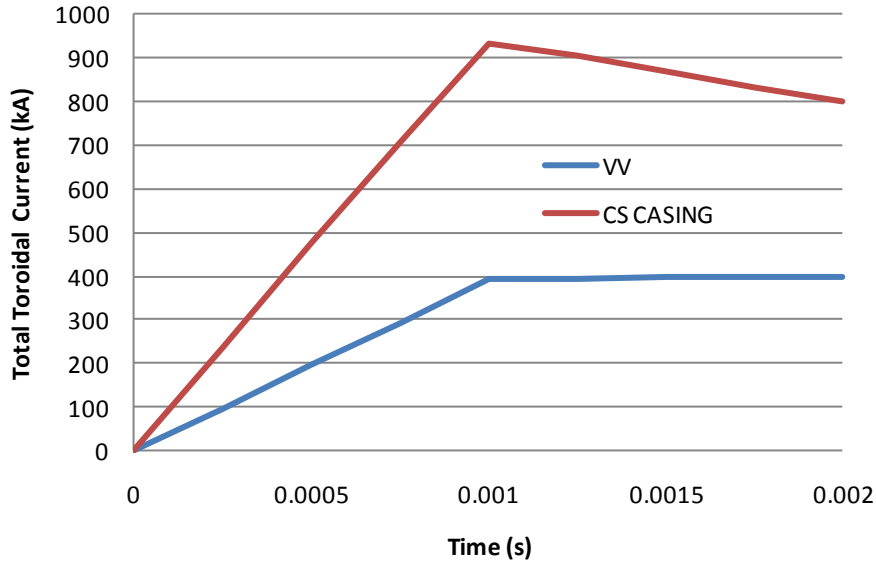
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Surface contours: JMOD

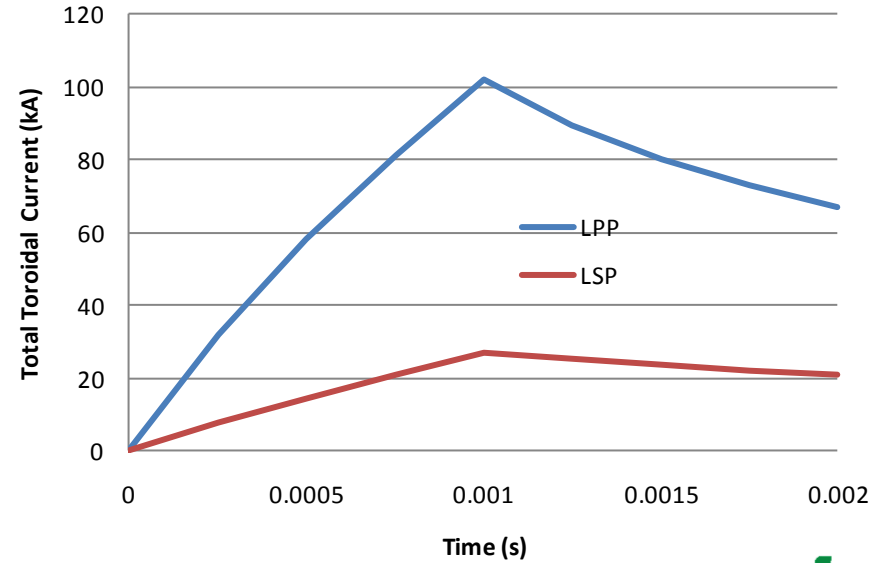


Total Toroidal Current Induced during Disruption

Eddy Current on VV and CS Casing



Eddy Current on Lower Passive Plate

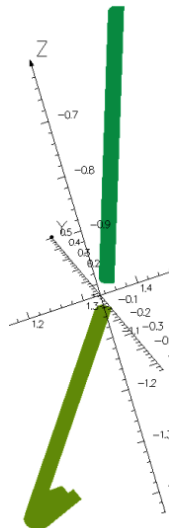


Background fields at center of lower PPPs (1.2, 0.72, -0.8) m

Lower PPP center	Br (T)	Bz (T)
coil background field (#79)	0.152	-0.465
with plasma at =0	-0.0265	-0.439
with plasma at 1ms	0.038	-0.264

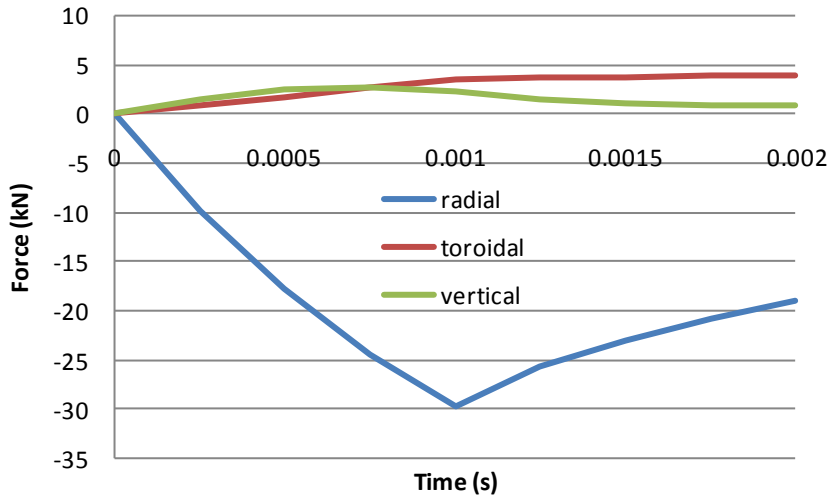
Center of lower PPPs

X (m)	Y (m)	Z (m)
1.2	0.72	-0.8

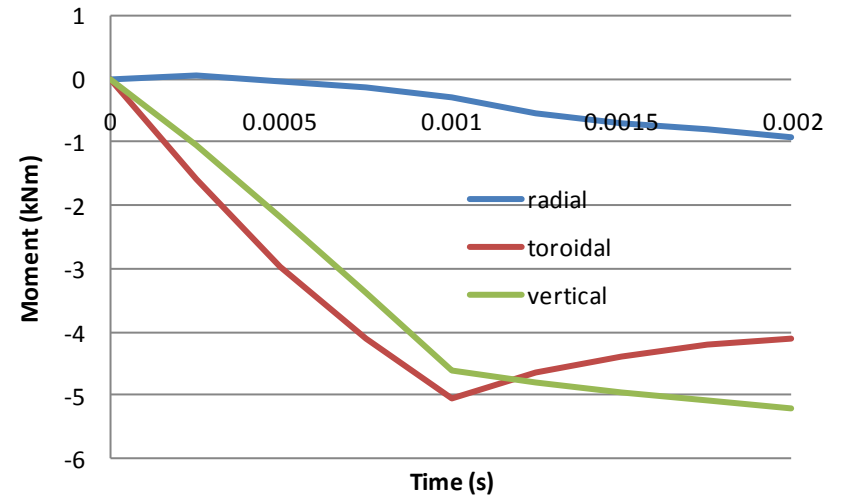


Disruption Loads on PPPs

Disruption Forces on PPPs



Disruption Moments on PPPs

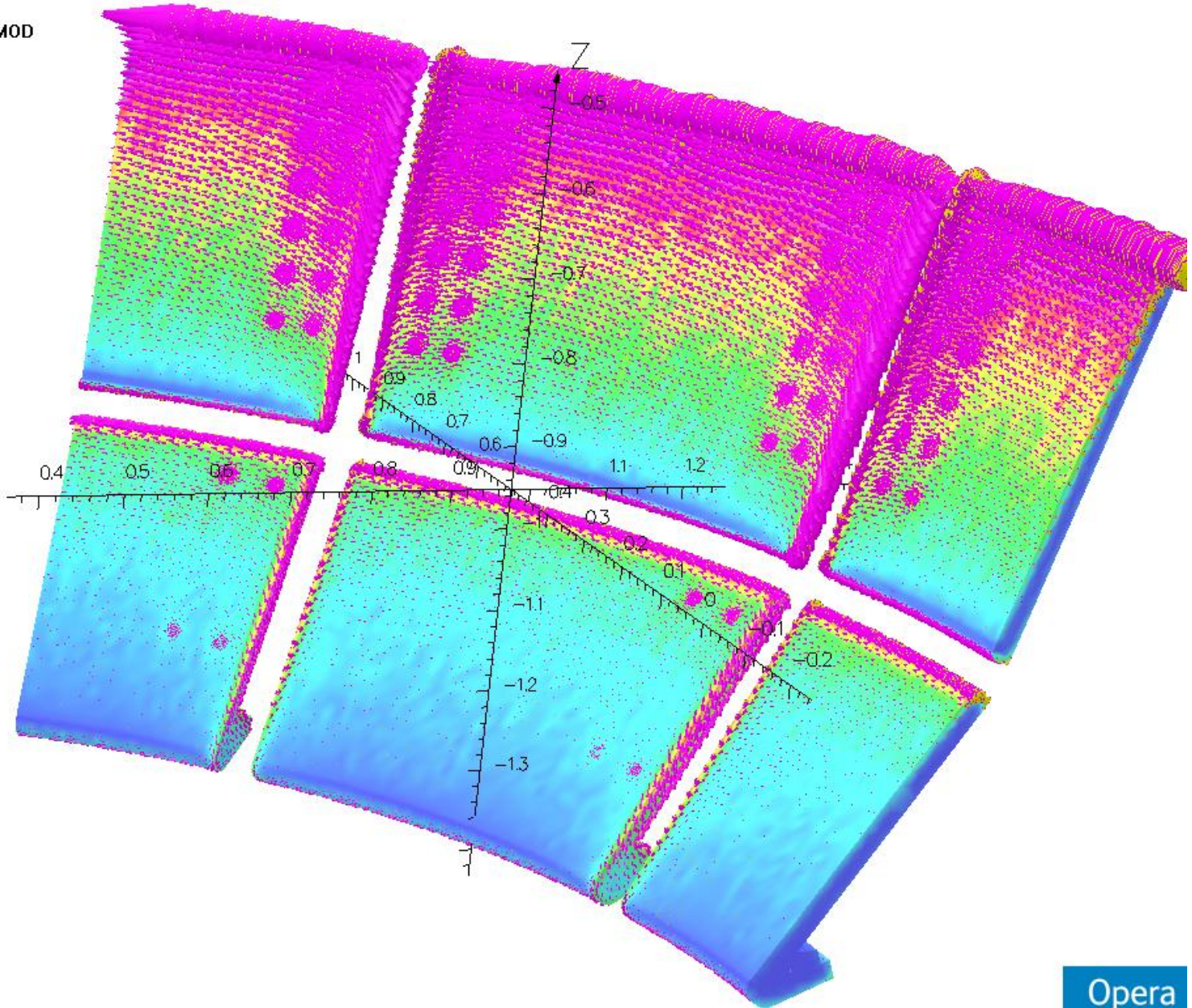
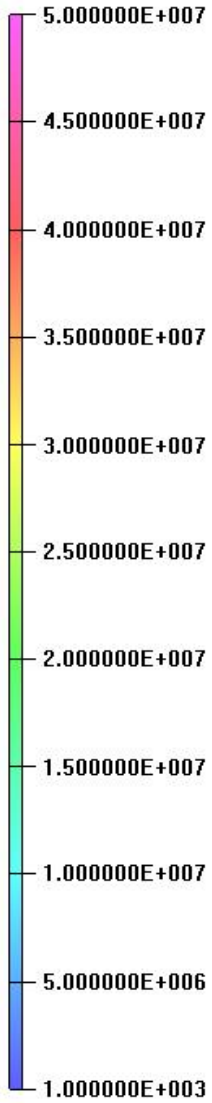


Moment center of lower PPPs

X (m)	Y (m)	Z (m)
1.2	0.72	-0.8

Disruption Analysis of Lower PPs

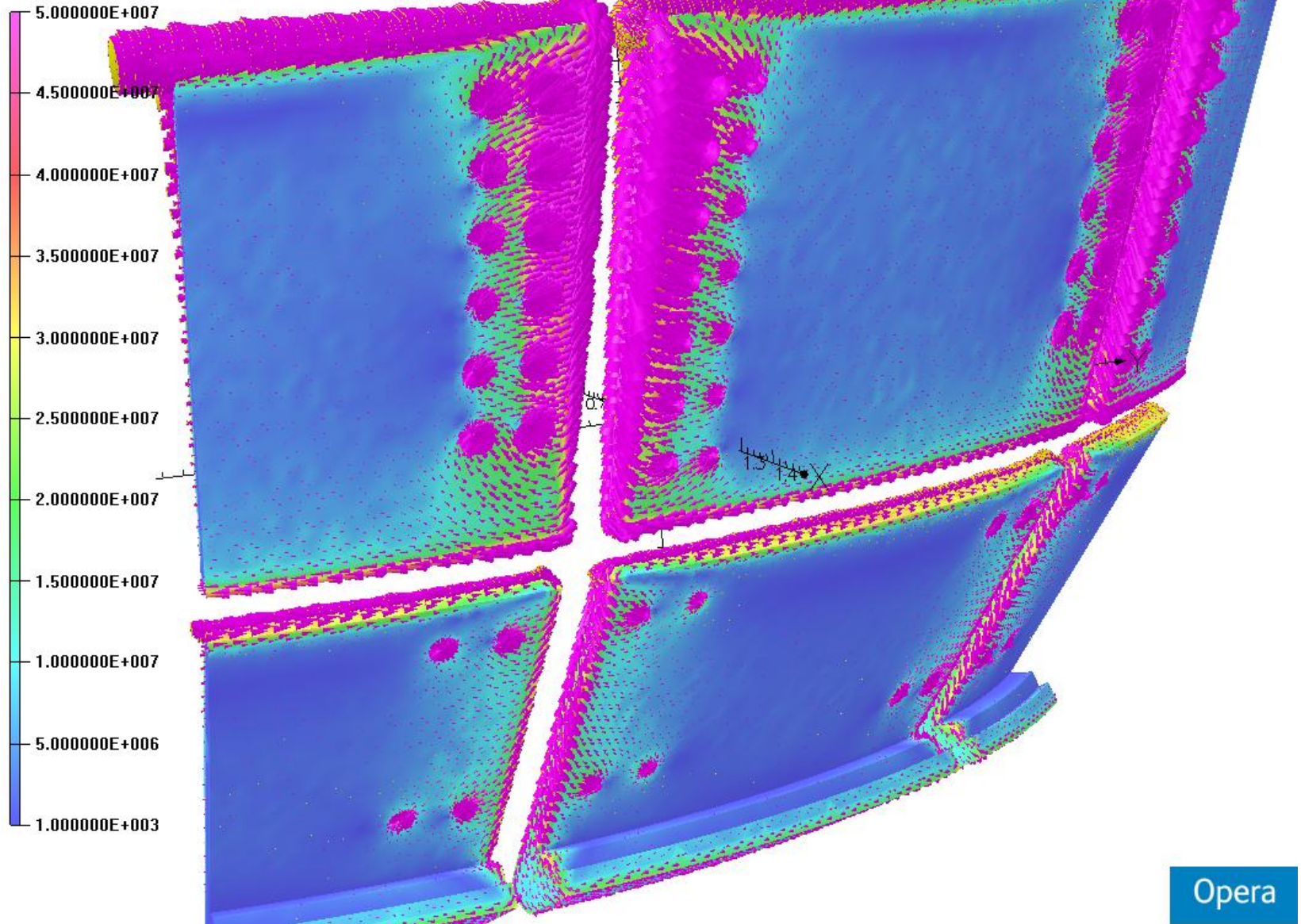
Surface contours: JMOD



Disruption Analysis of Lower PPs

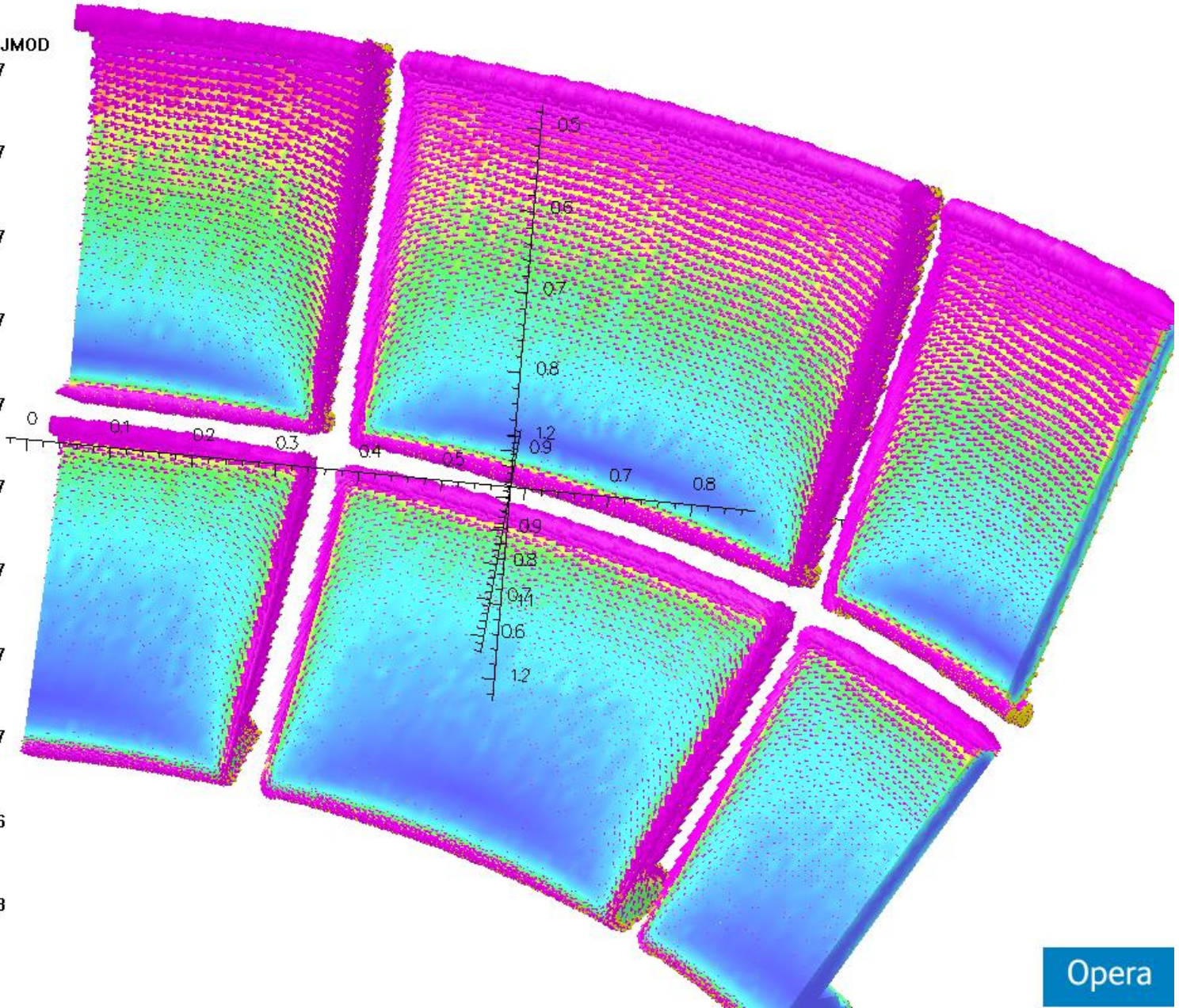
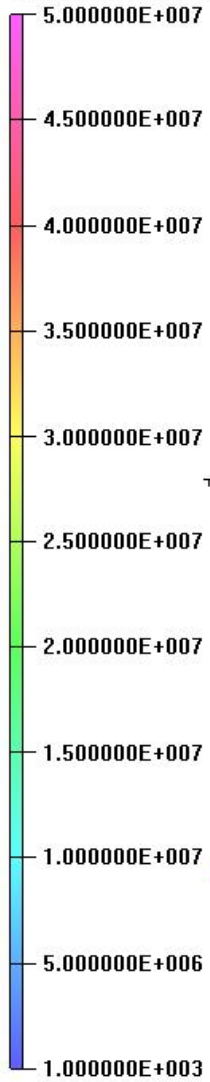
23/May/2011 11:08:16

Surface contours: JMOD



Mid Disruption Analysis of Upper PPs

Surface contours: JMOD



Disruption Analysis of Upper PPs

23/may/2011 11:13:34

Surface contours: JMOD

