MICE PRY Update

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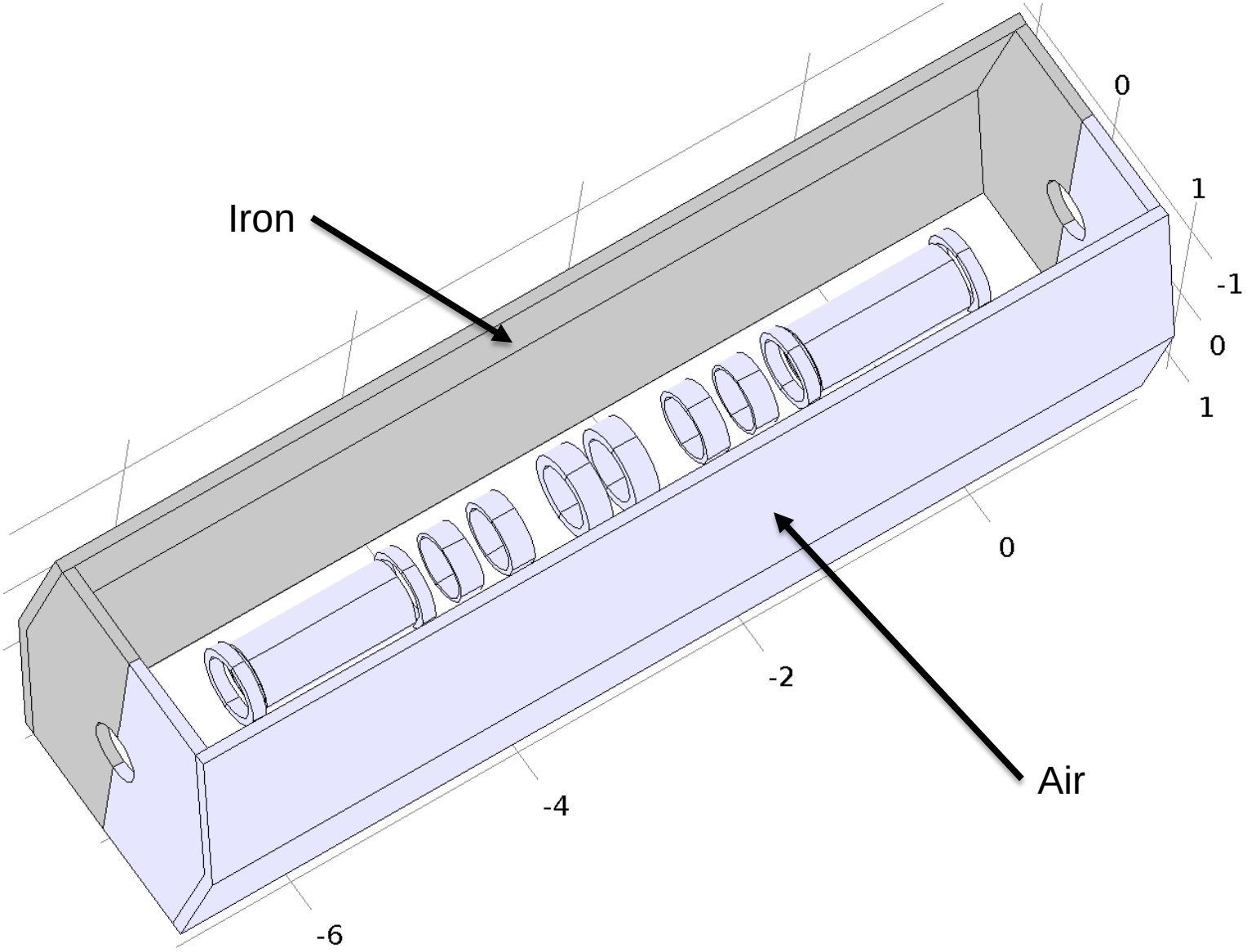
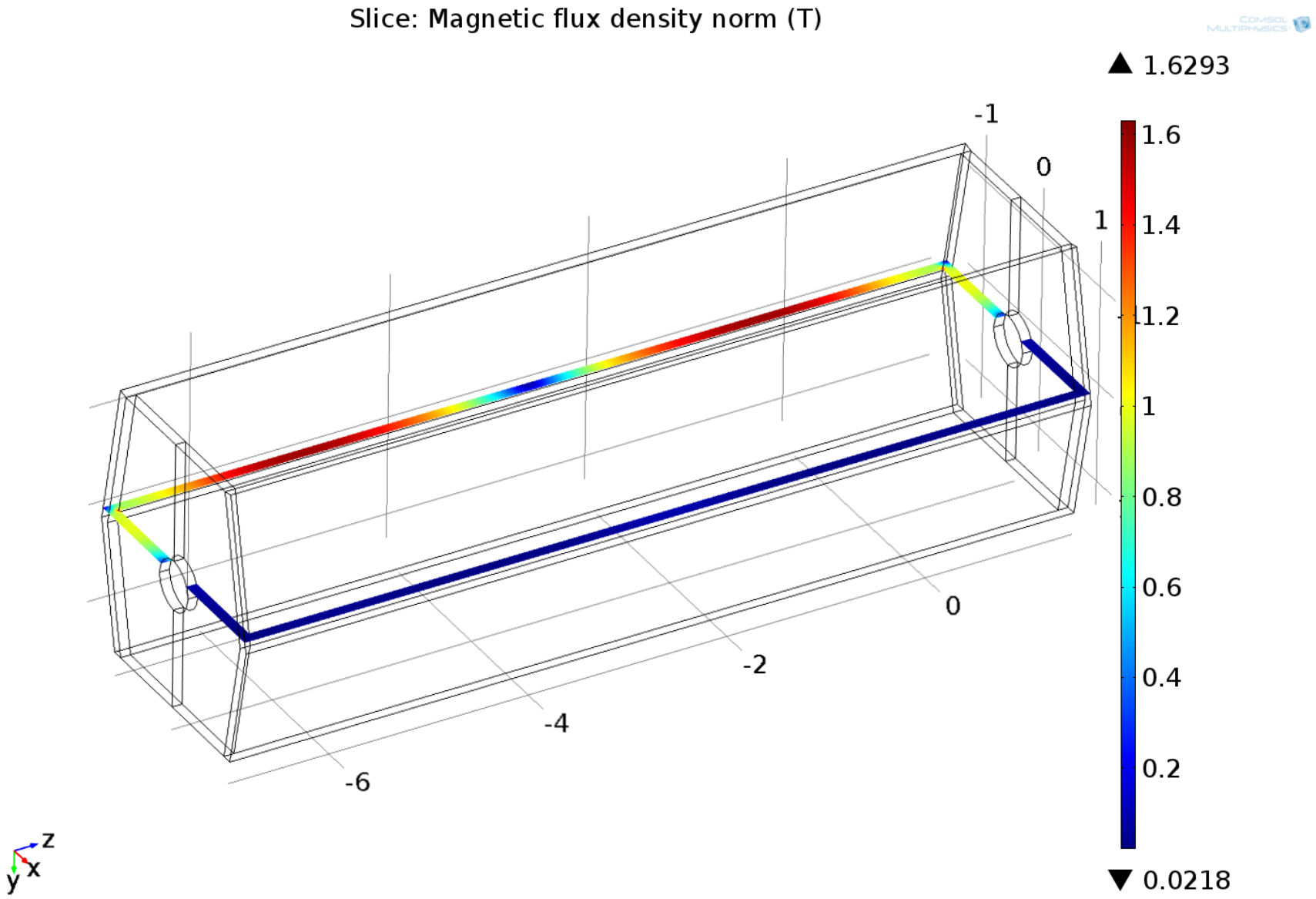
Half PRY Simulation



Magnetization 240 MeV Flip



Half PRY Simulation

F_x

	FC	M1	M2	E1	SS	E2
240 MeV Sol	-586.816	494.1975	38.67561	-253.506	-6253.47	-3047.79
240 MeV Flip	-4273	-2835	-2673	-2315	-10344	-3414

PRY1 (Sol/Flip): F_x=9706 N / 42596 N

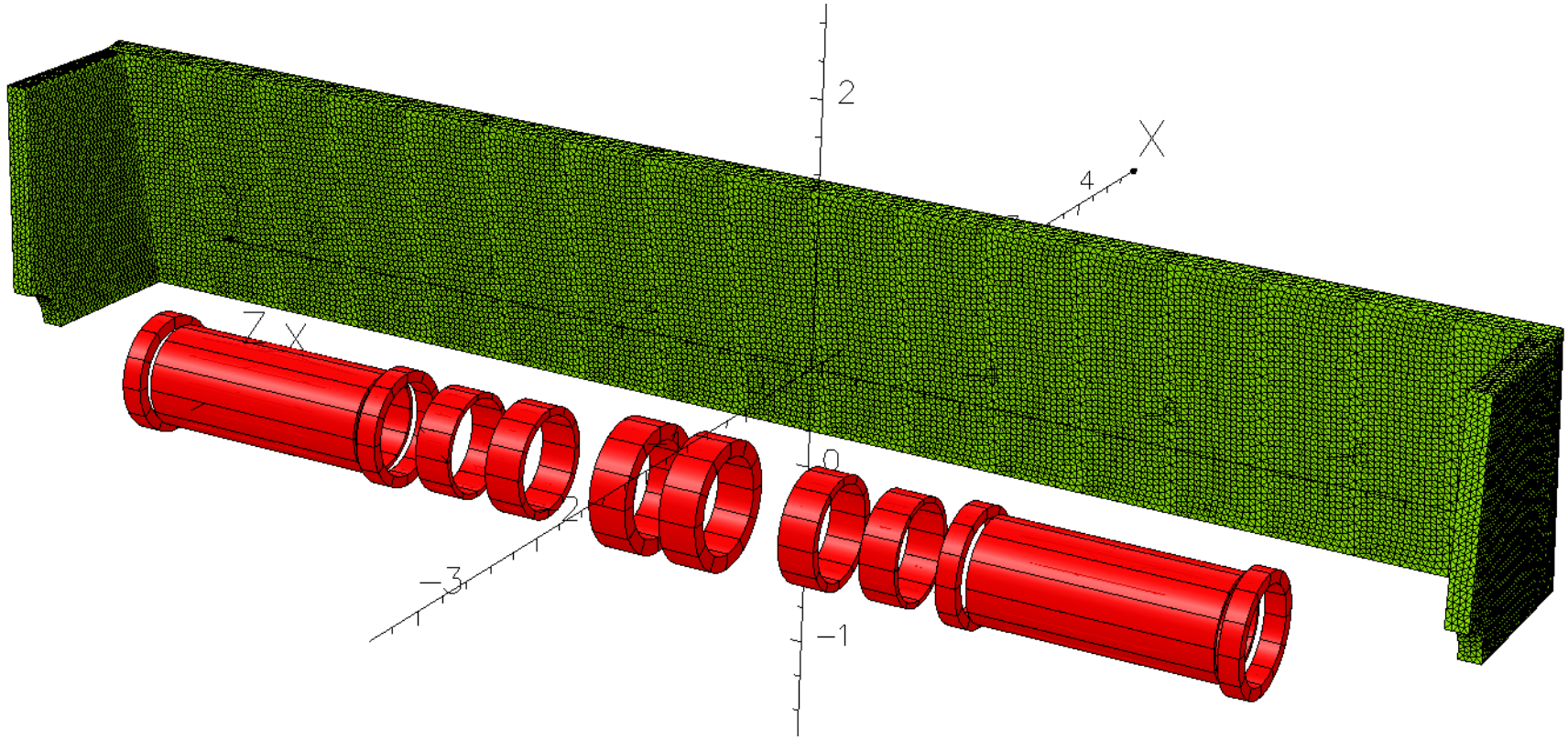
F_y

	FC	M1	M2	E1	SS	E2
240 MeV Sol	-596.057	87.1719	140.0893	52.81796	-158.542	-155.066
240 MeV Flip	-1935	174	576	50	-243	-167

Opera simulations on the way

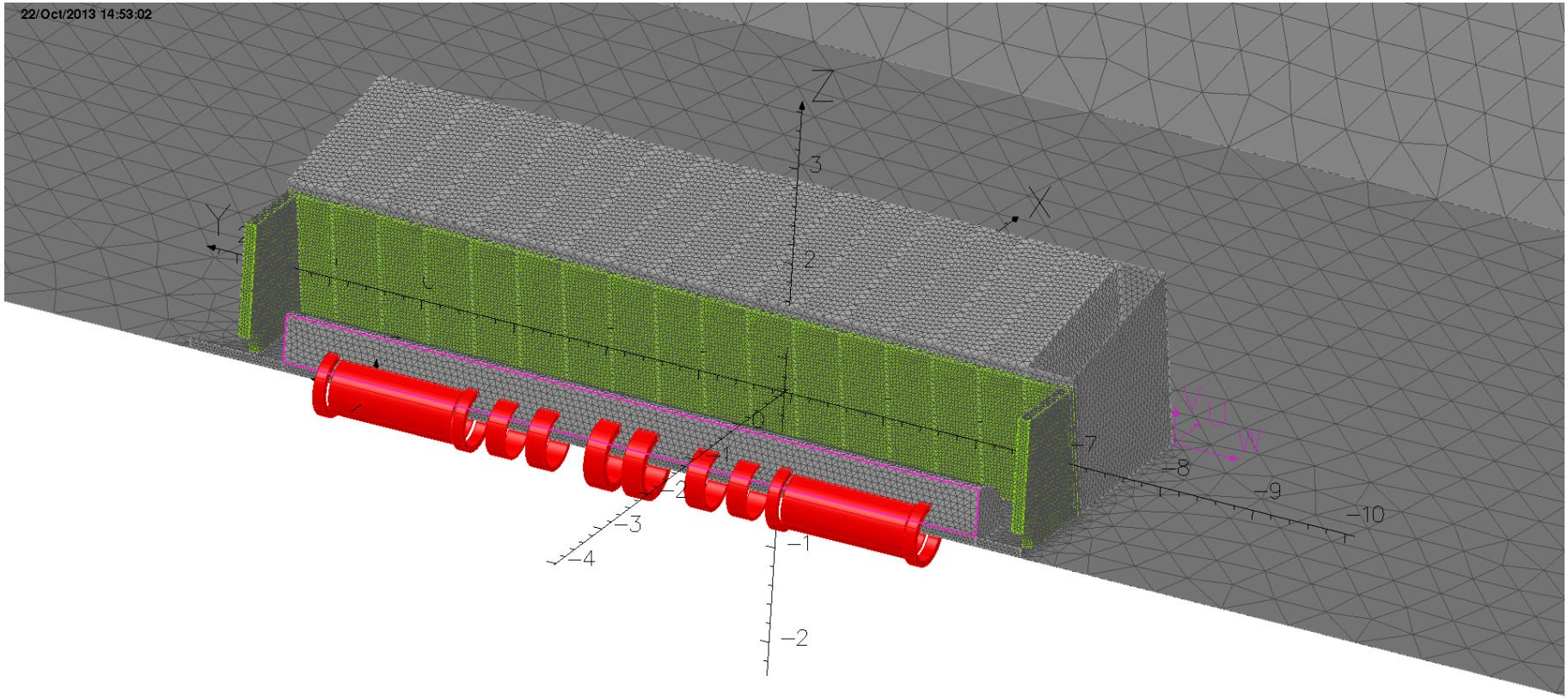
Benchmark

Reconfirmed geometry

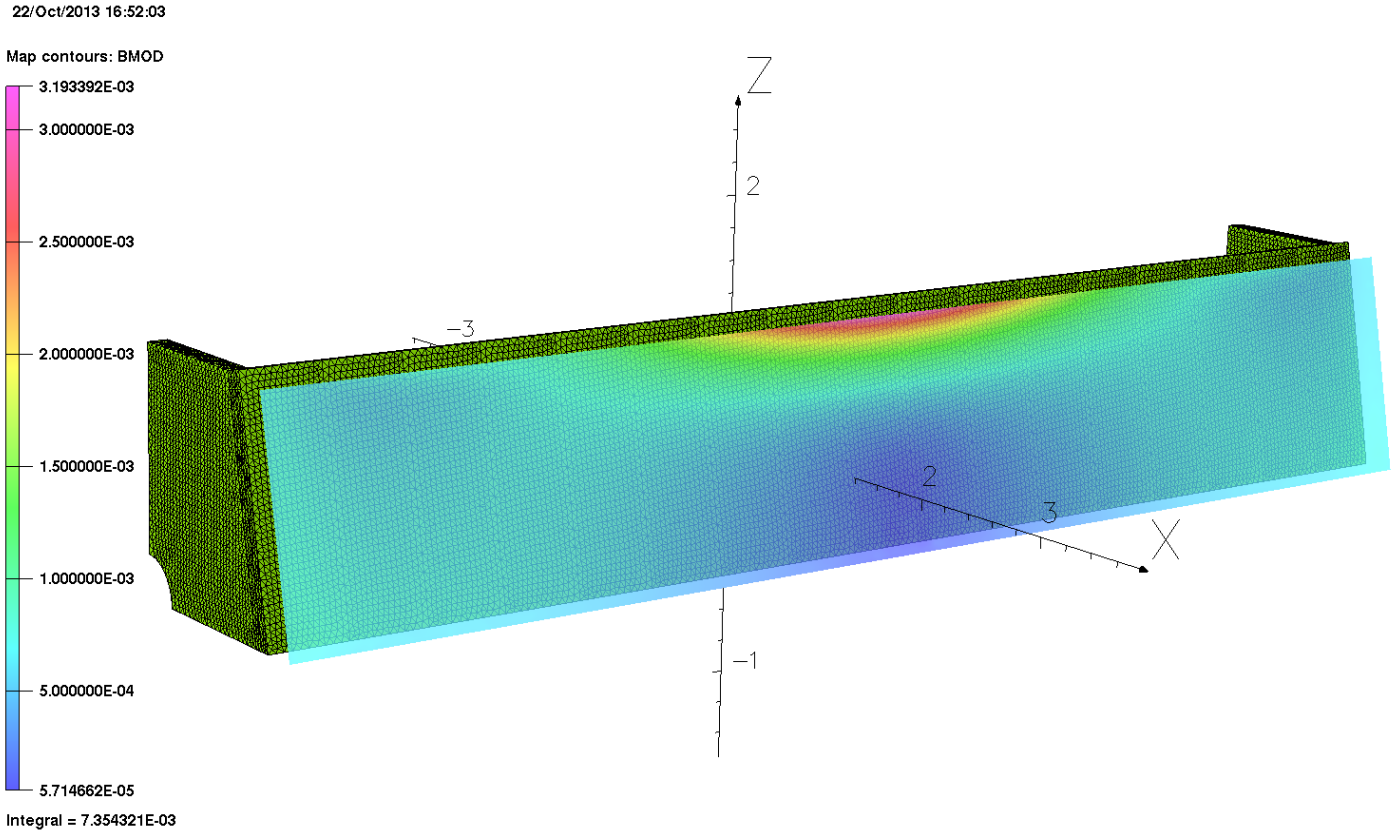


AISI 1010 (Opera)
12 cm steel

Mesh


22/Oct/2013 14:53:02
Z
X
Y
3
2
1
0
−1
−2
−3
−4
−7
−8
−9
−10
V
U
W
opera
simulation software

240 MeV Flip



UNITS

Length	m
Magn Flux Density	T
Magnetic Field	A/m
Magn Scalar Pot	A
Current Density	A/m²
Power	W
Force	N

MODEL DATA

MiceStepIV240MeVFlipNewPRY1.op3
Magnetostatic (TOSCA)
Nonlinear materials
Simulation No 1 of 1
2873966 elements
4126301 nodes
12 conductors
Nodally interpolated fields
with coil fields by integration
Activated in global coordinates

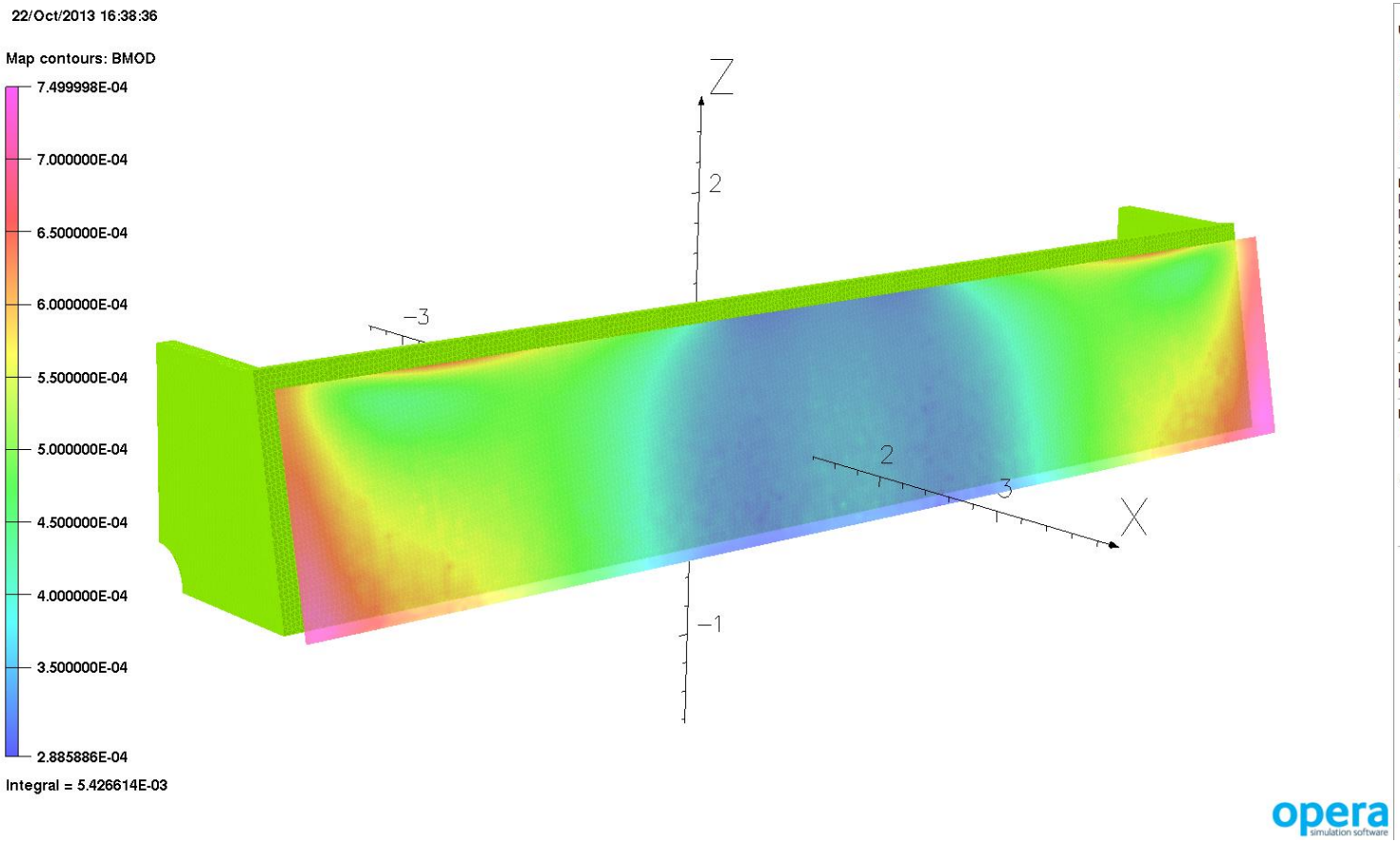
Field Point Local Coordinates

Local = Global

FIELD EVALUATIONS

Cartesian	CARTESIAN (nodal/inte)	240x60	Cartesian
	x=1.5 to 1.2	y=-7.0 to 1.5	z=0.0 to 1.4

240 MeV Solenoid



UNITS

Length	m
Magn Flux Density	T
Magnetic Field	A/m
Magn Scalar Pot	A
Current Density	A/m^2
Power	W
Force	N

MODEL DATA

MiceStepIV240MeVSolNewPRY1.op3
Magnetostatic (TOSCA)
Nonlinear materials
Simulation No 1 of 1
2873966 elements
4126301 nodes
12 conductors
Nodally interpolated fields
with coil fields by integration
Activated in global coordinates

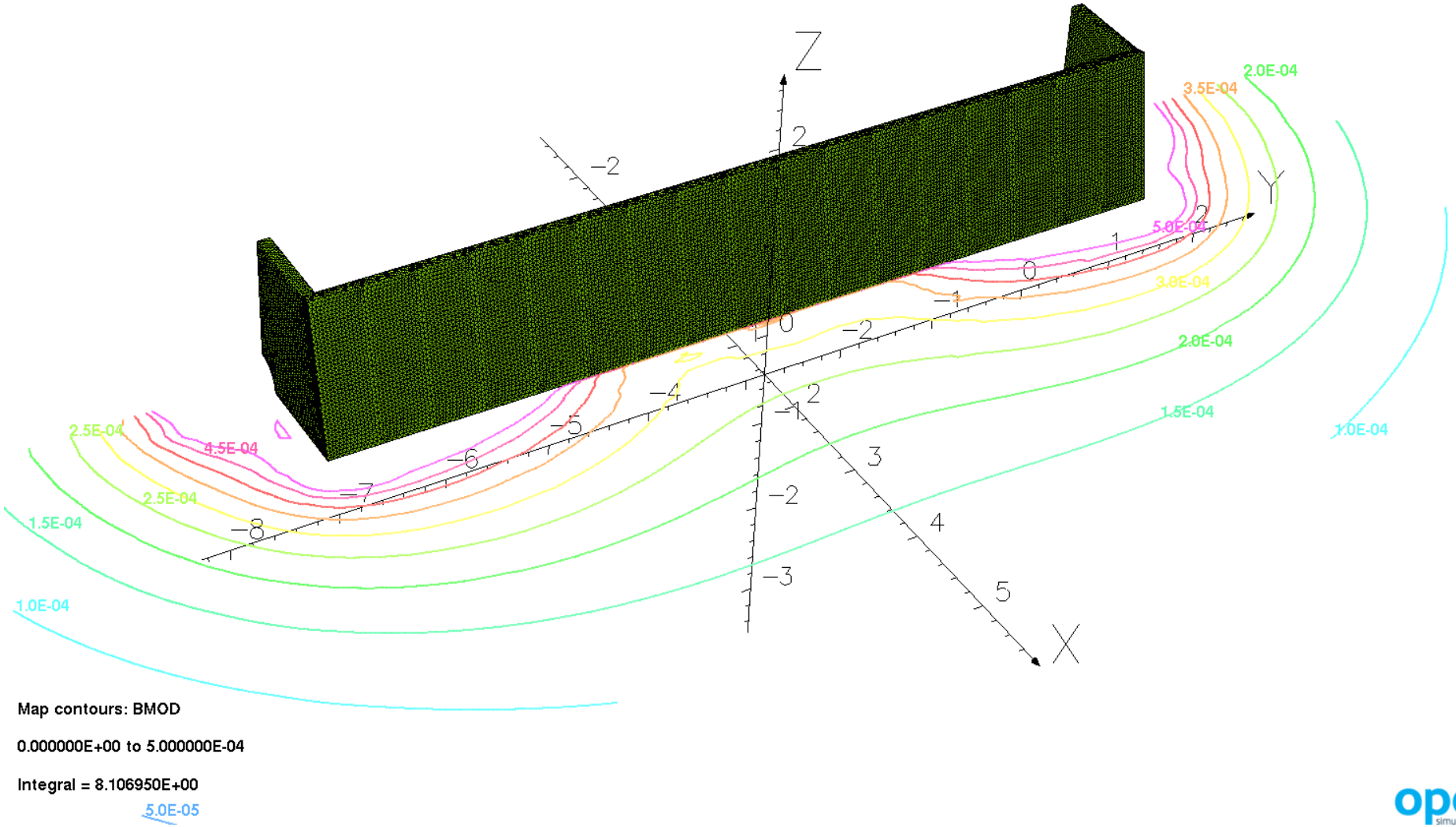
Field Point Local Coordinates

Local = Global

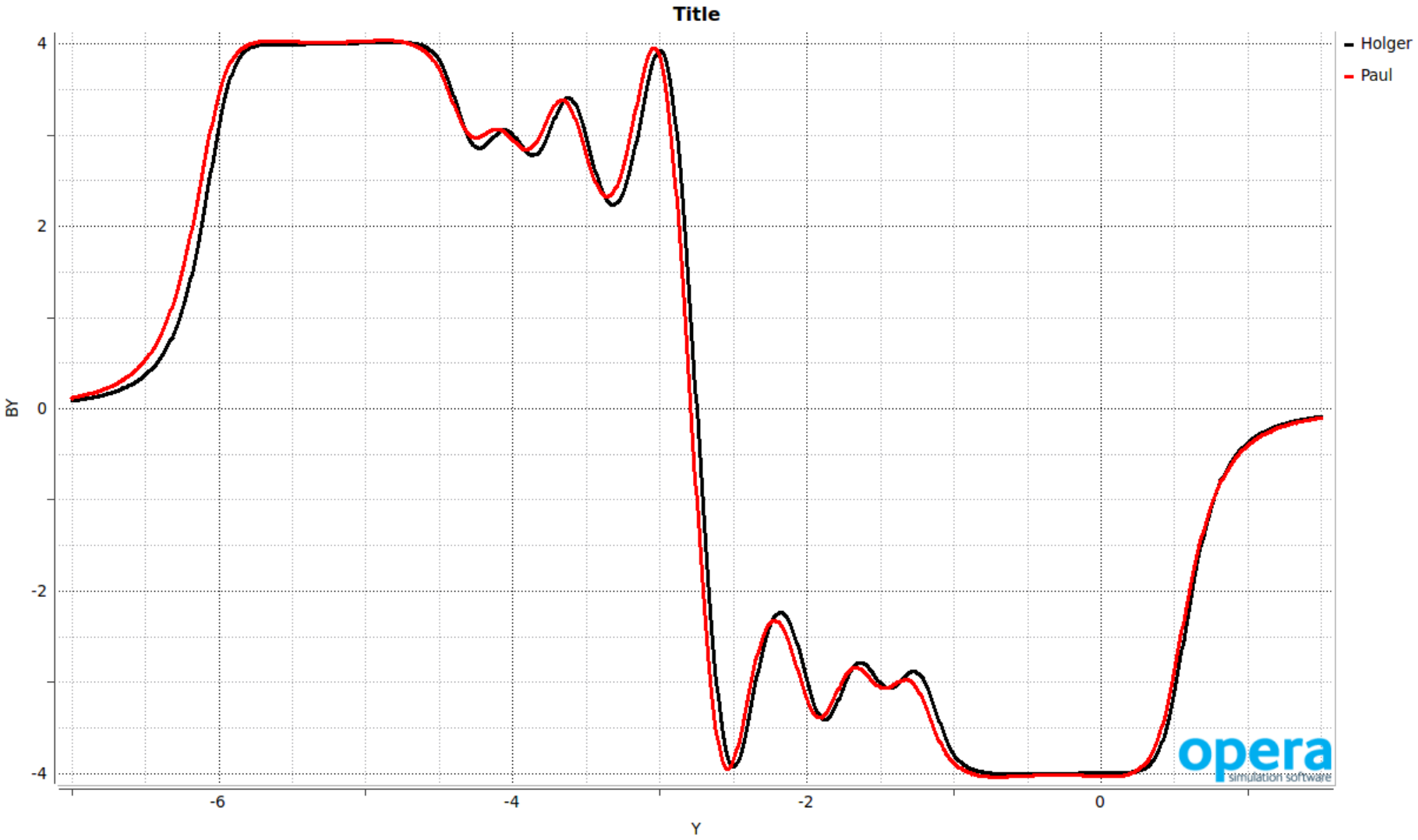
FIELD EVALUATIONS

Line	LINE (nodal)	501	Cartesian
	x=1.5	y=-7.0 to 1.5	z=0.0
Cartesian	CARTESIAN (nodal/inte)	240x60	Cartesian
	x=1.5 to 1.2	y=-7.0 to 1.5	z=0.0 to 1.4

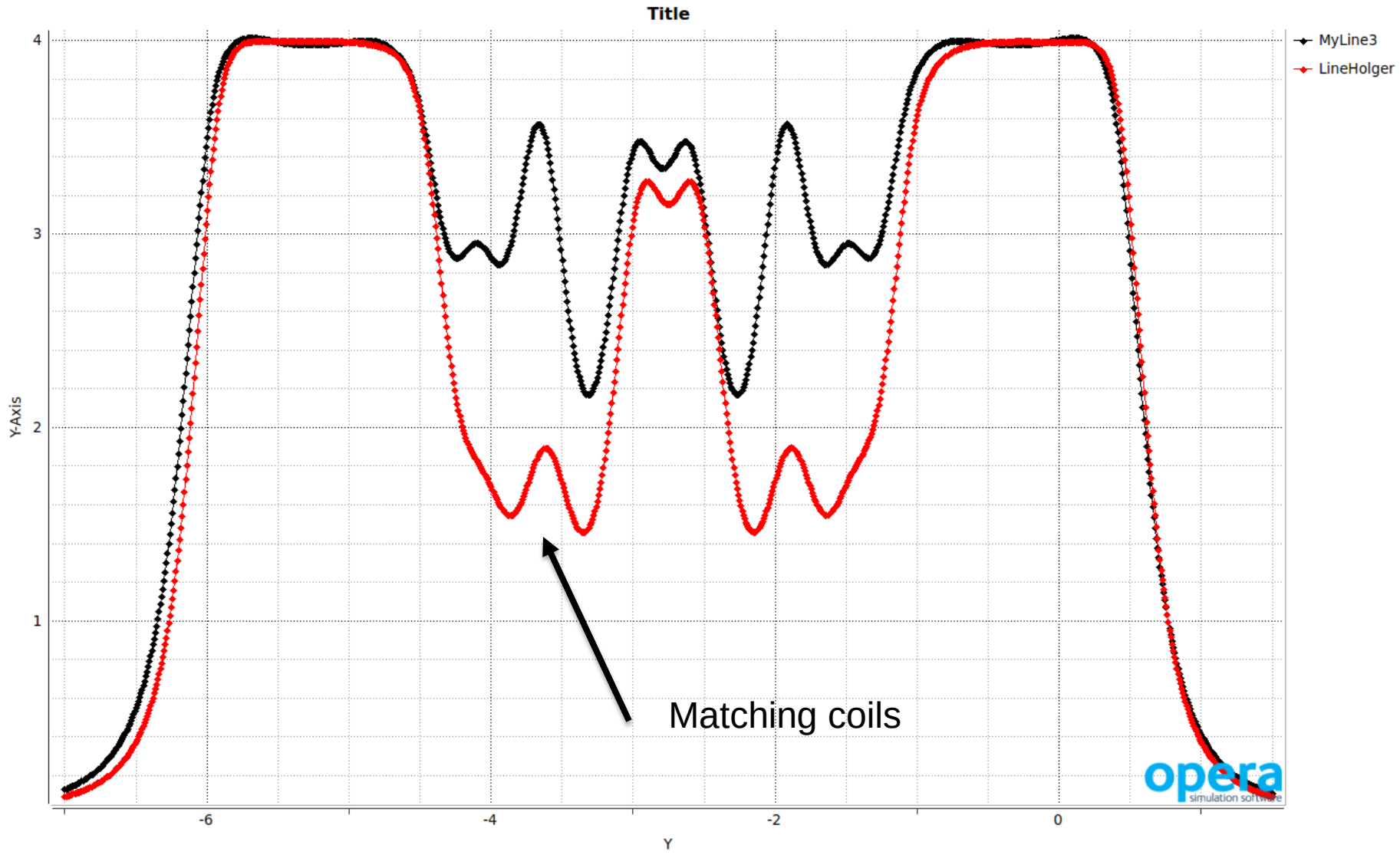
5 Gauss Line


Z
Y
X
2.0E-04
3.5E-04
5.0E-04
3.0E-04
2.0E-04
1.5E-04
1.0E-04
2.5E-04
4.5E-04
2.5E-04
1.5E-04
1.0E-04
Map contours: BMOD
0.000000E+00 to 5.000000E-04
Integral = 8.106950E+00
5.0E-05

240 MeV Flip


Title
Holger
Paul
BY
Y
4
2
0
-2
-4
-6
-4
-2
0
opera
simulation software

240 MeV Solenoid

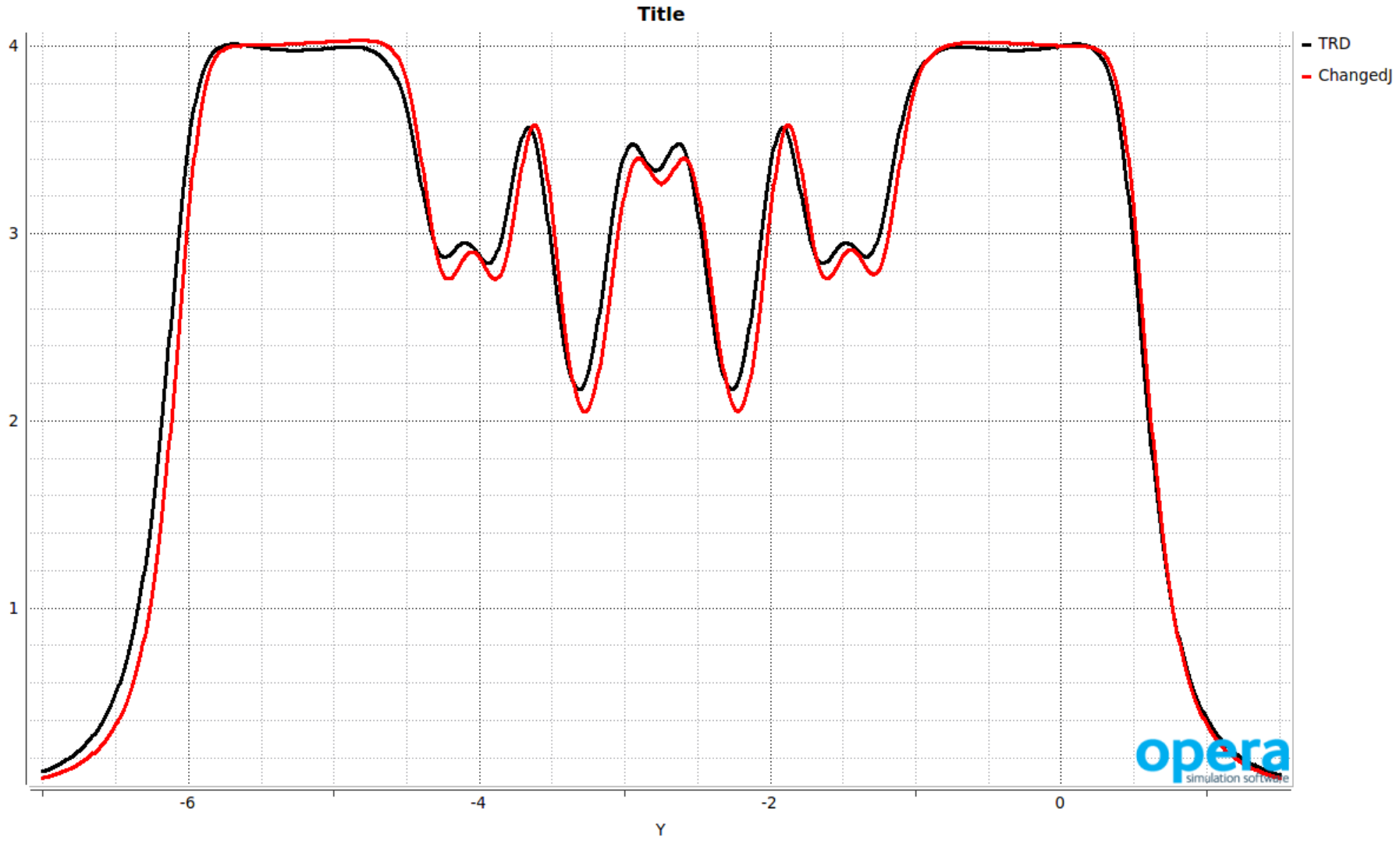


Coil Geometry

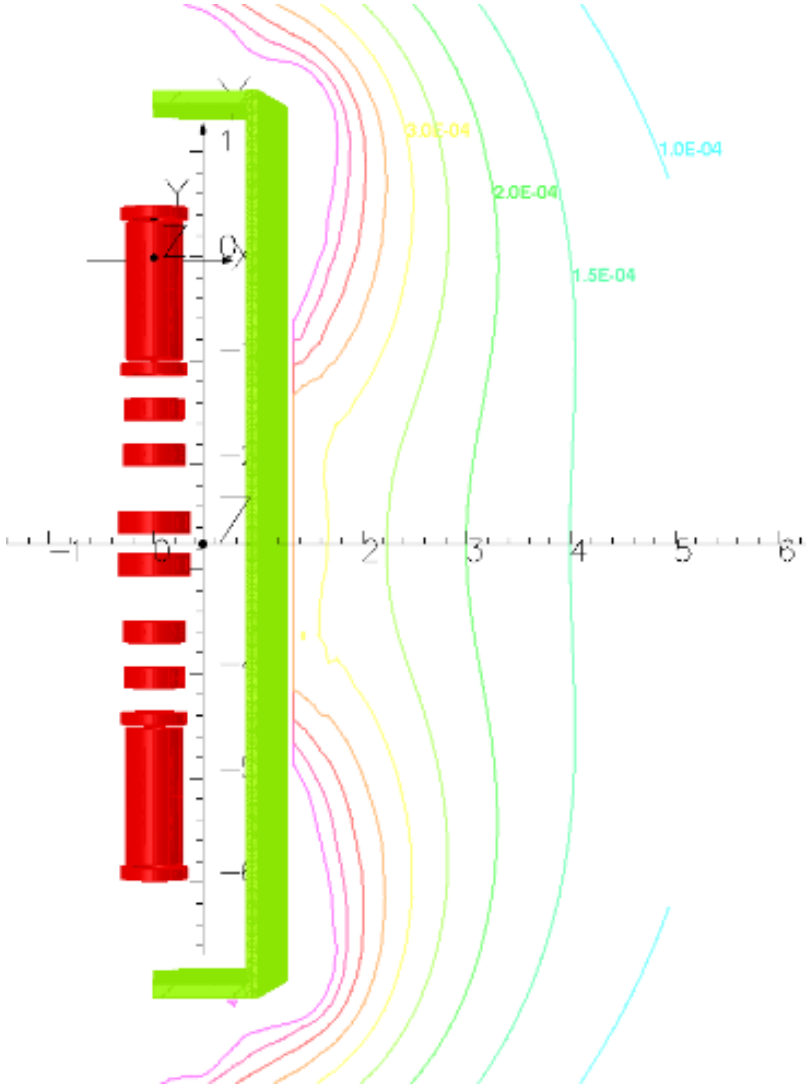
	M1 (TRD)	M1	M2 (TRD)	M2
R1 (mm)	255	258	255	258
R2 (mm)	355	302.7	312	287.8
Z1 (mm)	3752	3711.6	4193	4150.8
Z2 (mm)	3550	3510.4	3991	3951.3
J (A/mm^2)	71.31	71.6	65.6	66

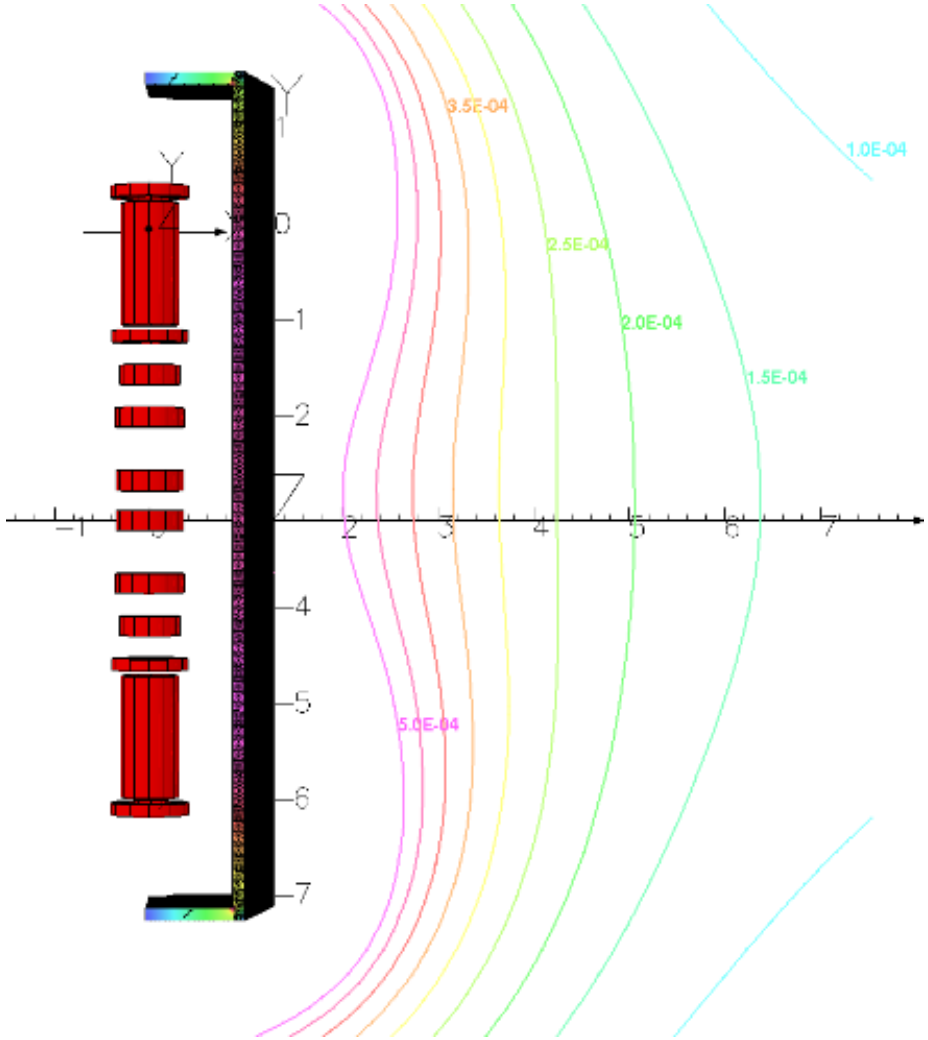
Difference in coil cross-section:
M1: 20200/8993.64 = 2.25
M2: 11514/5945.1 = 1.94

240 MeV Solenoid (adj. J)



New Solenoid Currents

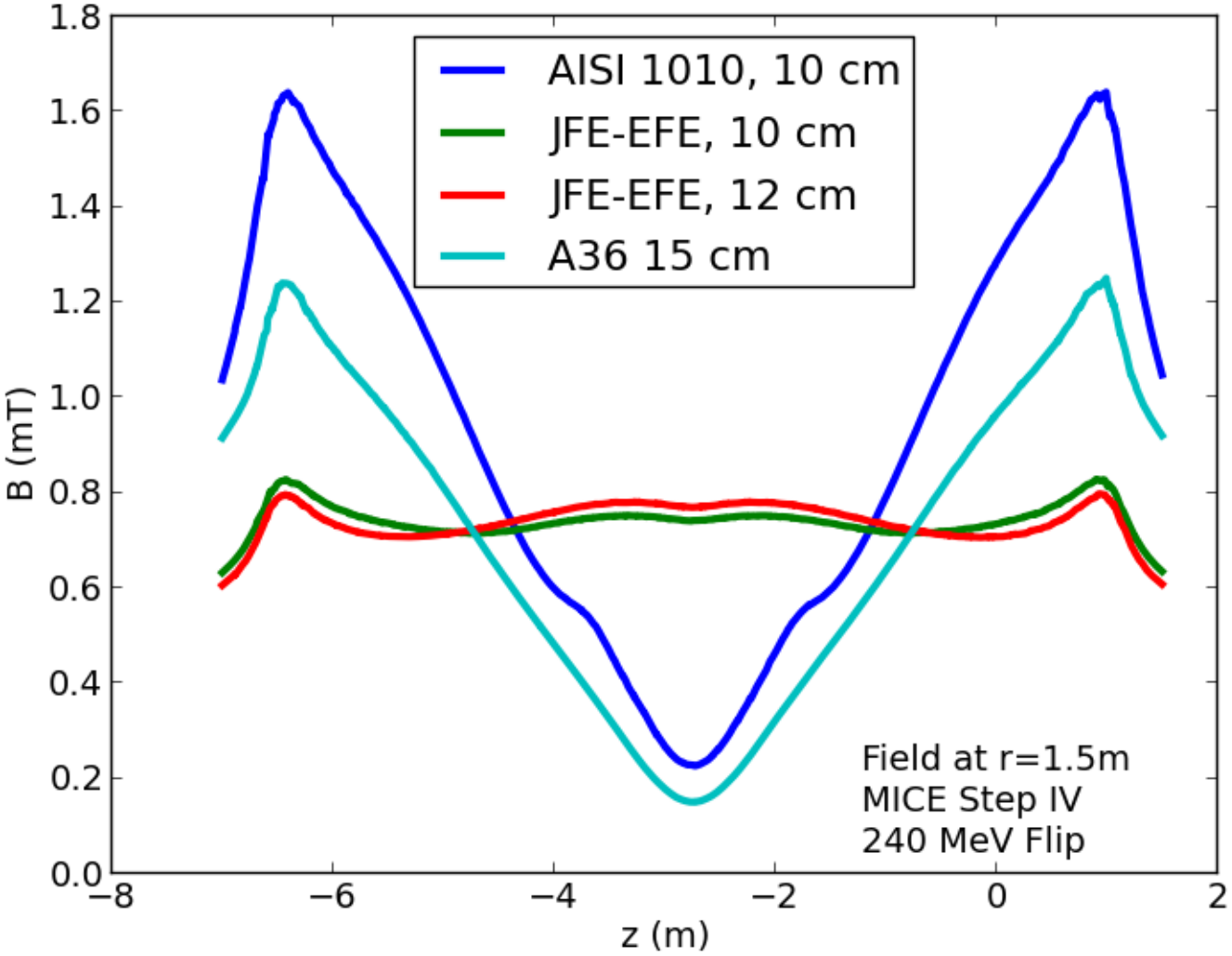




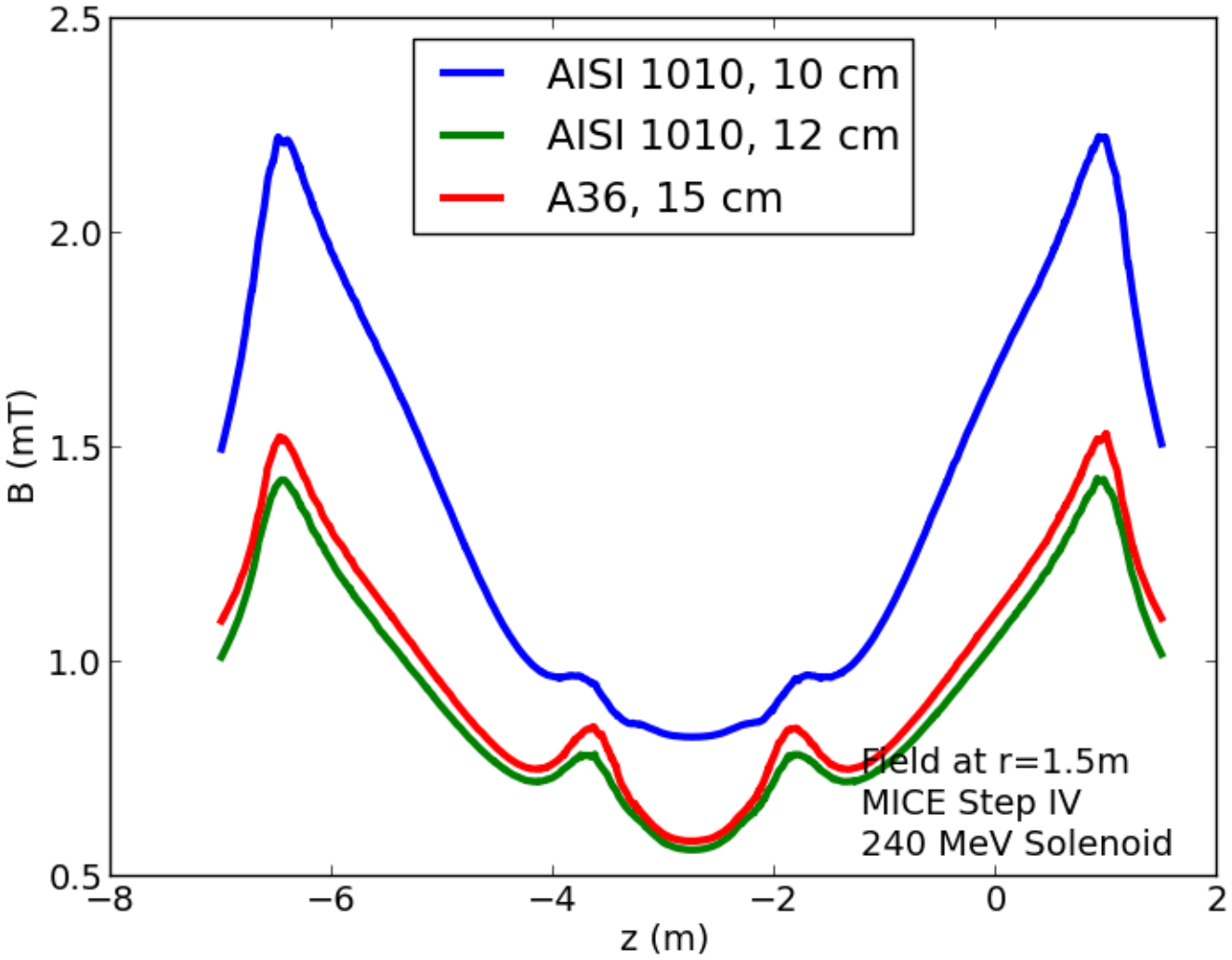
Simulation Updates

- Verification of PRY geometry
  - PRY in simulation 0.5 m too long
  - Shift of 0.25 m of Virostek disc causes increase in stray field
- Reason: ?
  - Theory: more flux coupled into PRY over smaller area
- Simulations
  - Forces
  - Gap study Virostek disc / extension

Flip Modes

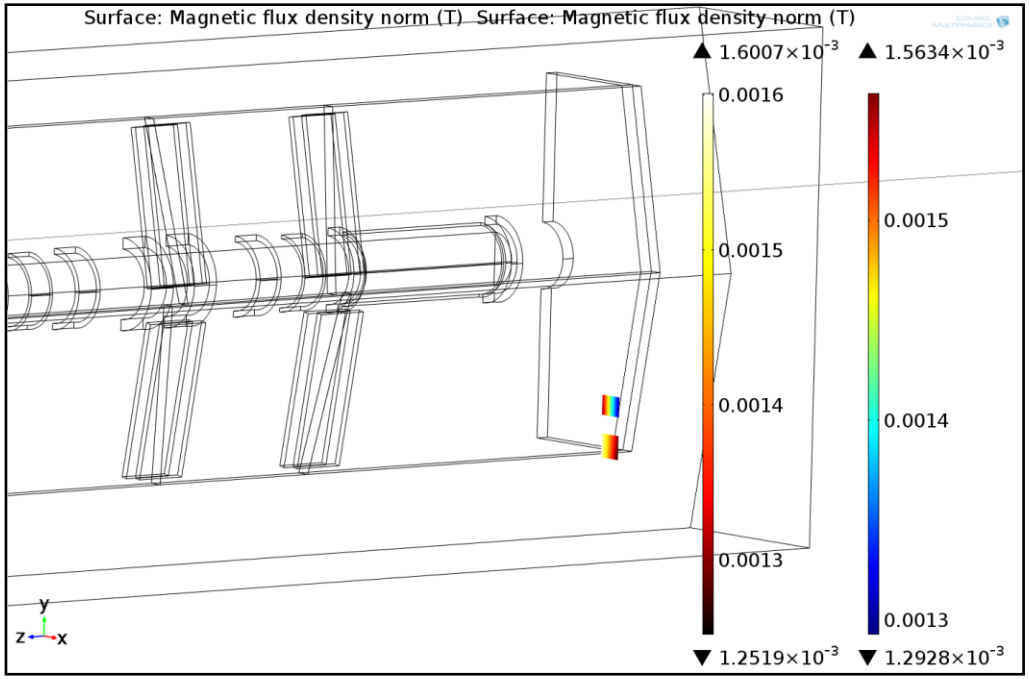

AISI 1010, 10 cm
JFE-EFE, 10 cm
JFE-EFE, 12 cm
A36 15 cm
Field at r=1.5m
MICE Step IV
240 MeV Flip
B (mT)
z (m)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−8
−6
−4
−2
0
2

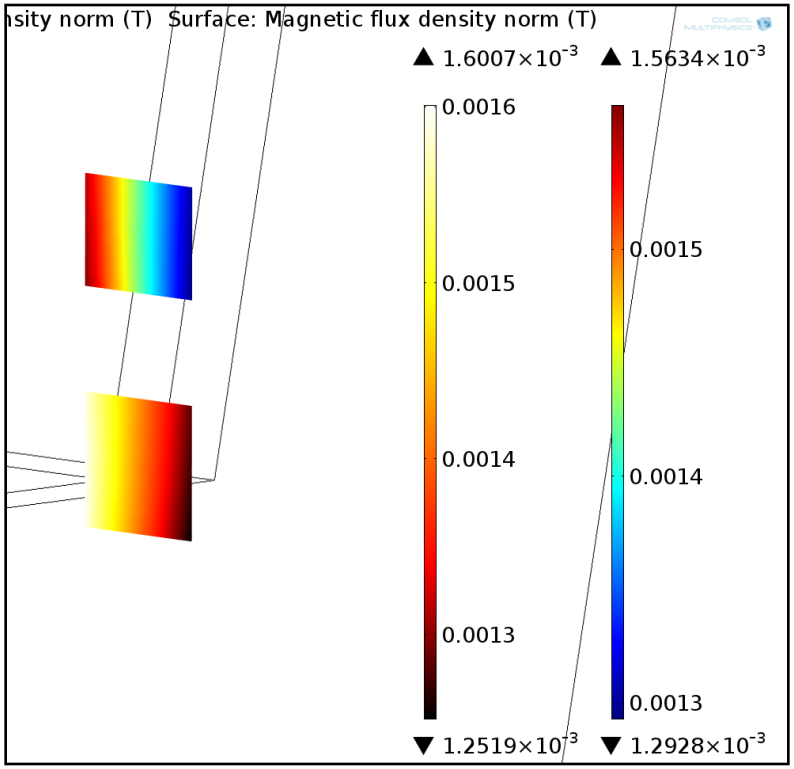
Solenoid Modes



JFE-EFE steel?

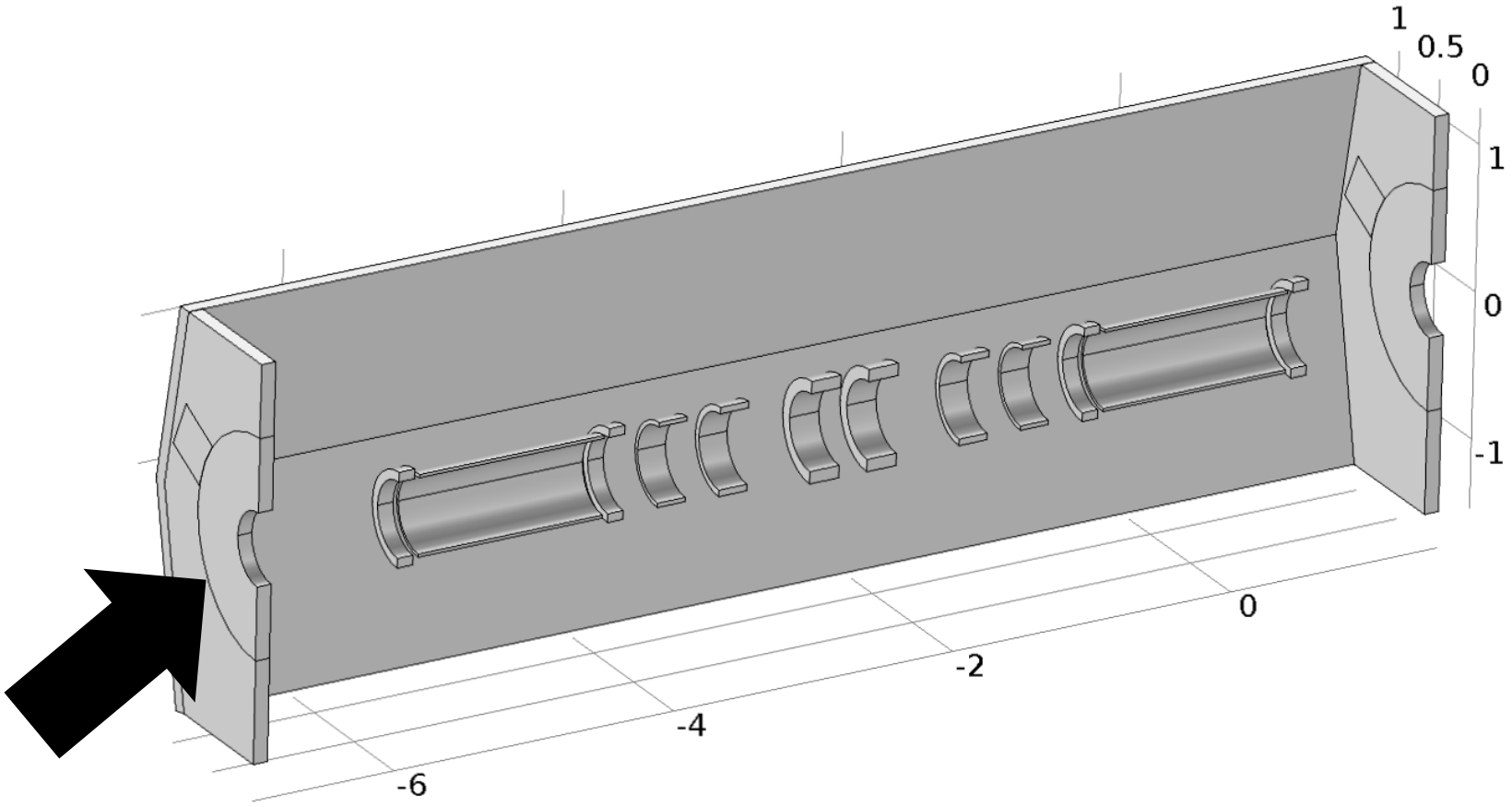
Field Turbo Pump / Weiner PS



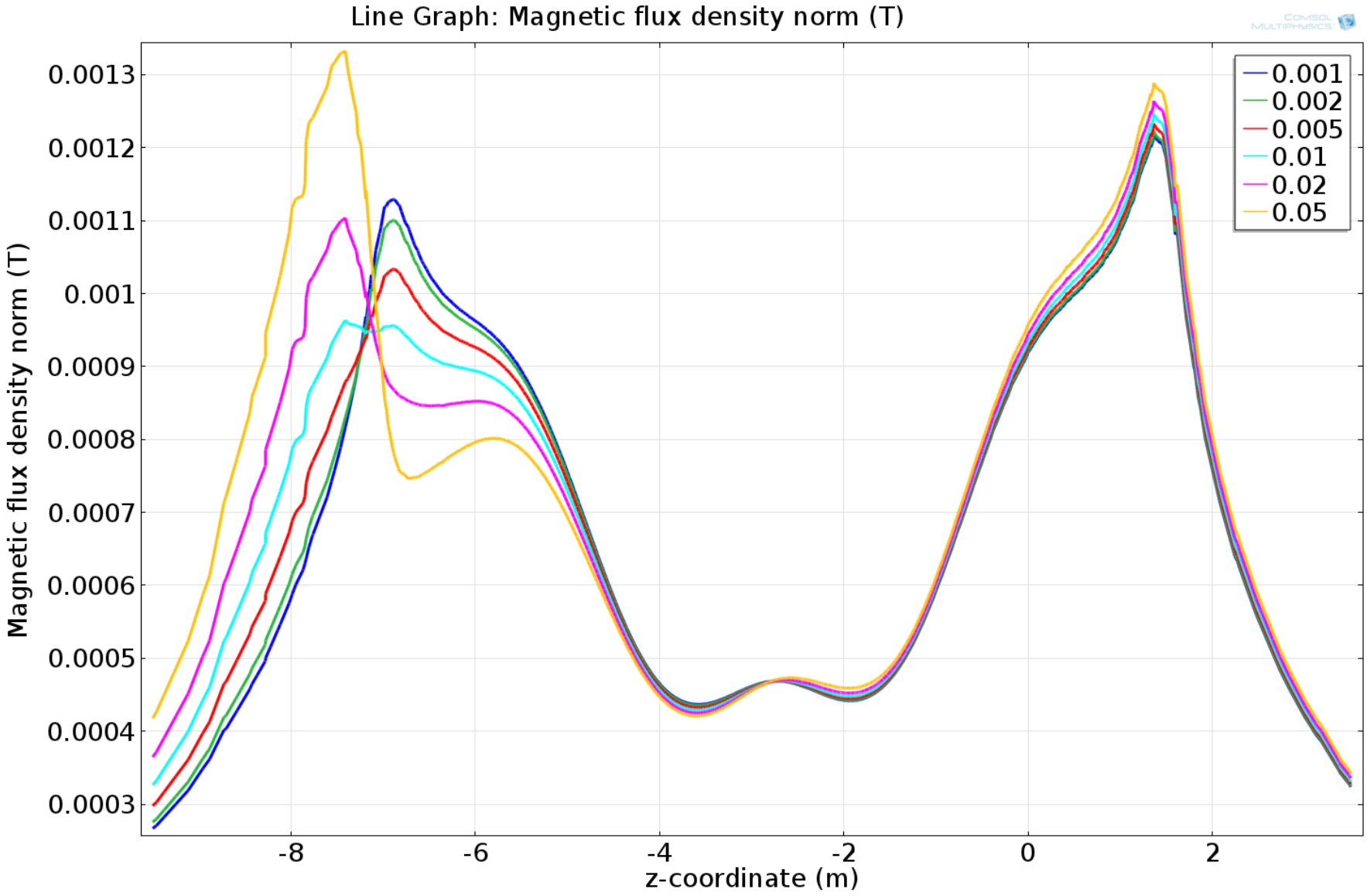


240 MeV Flip, 1010 steel

Gap Virostek Disc / Extension



240 MeV Solenoid



EVA Magnet Steel

EVA Magnet Steel

- Ample supplies
- Thickness: 15 cm
- Unknown pedigree
  - Good magnet steel?
  - C 0.3%?
  - samples
- Controlled area

Process for Releasing Steel

- Preliminary survey in controlled area
  - No dose rate above background: move steel to low background area
- Survey on 8” grid pattern using hand held meter
- Examination with High Purity Germanium (HPGe) gamma spectroscopy unit
  - only Naturally Occurring Radioactivity Material: release for free use

Conclusion

- Response to reviewers
  - Forces?
  - Commissioning plan?