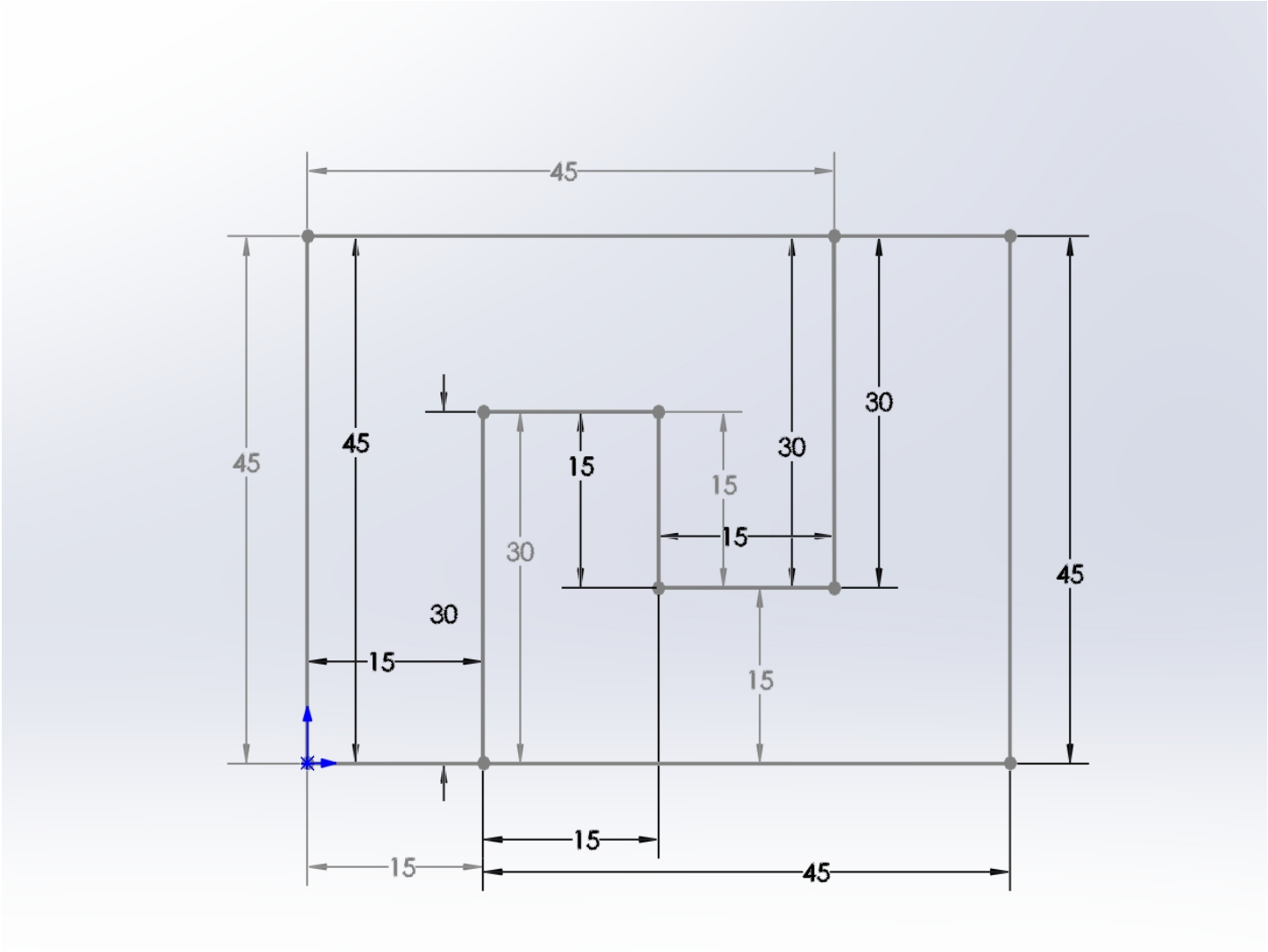
TFG_Z01 ... TFG_Z02X8_TR (11 December 2023 - deh)

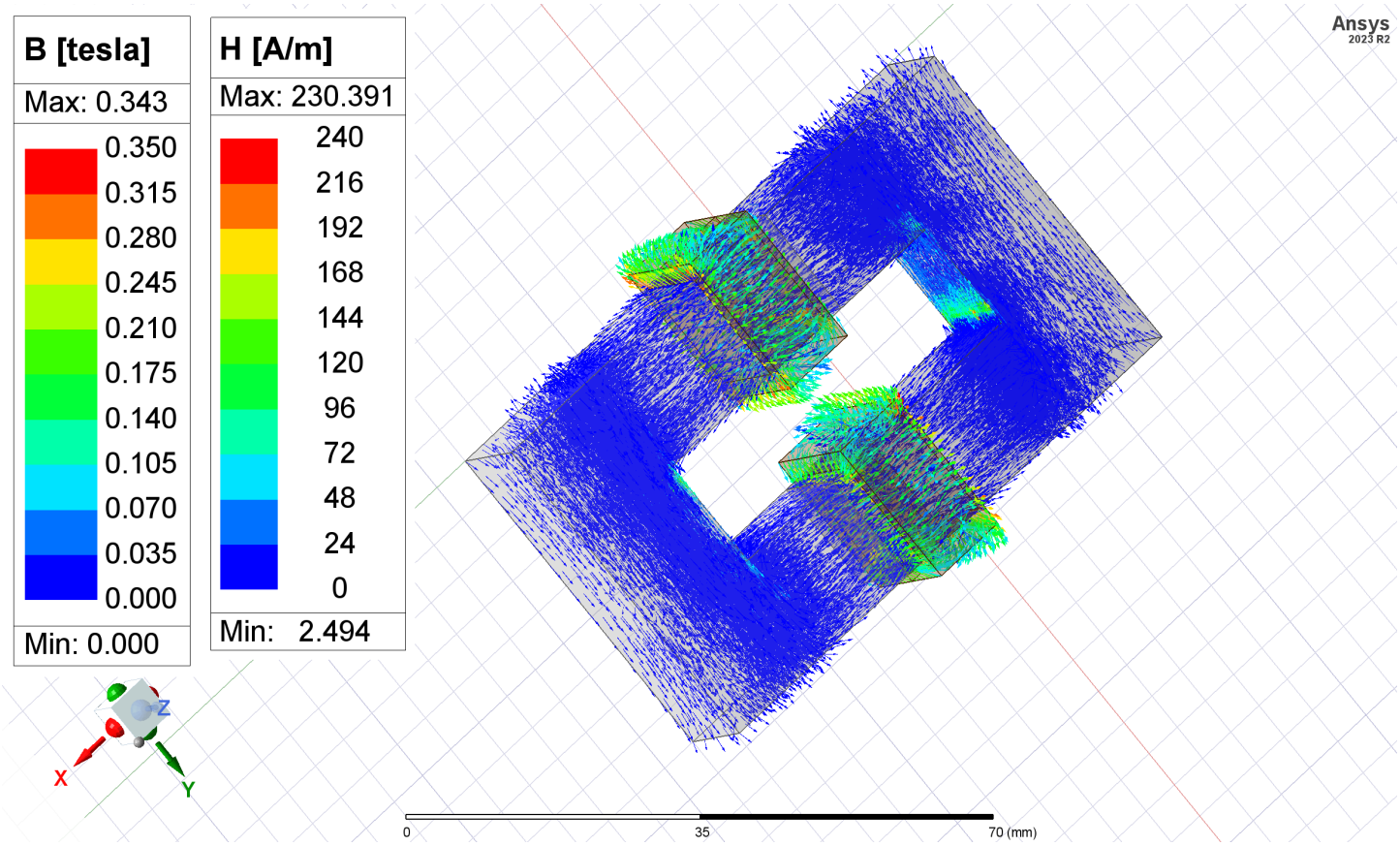
Lamination Orientation and Pole Spacing

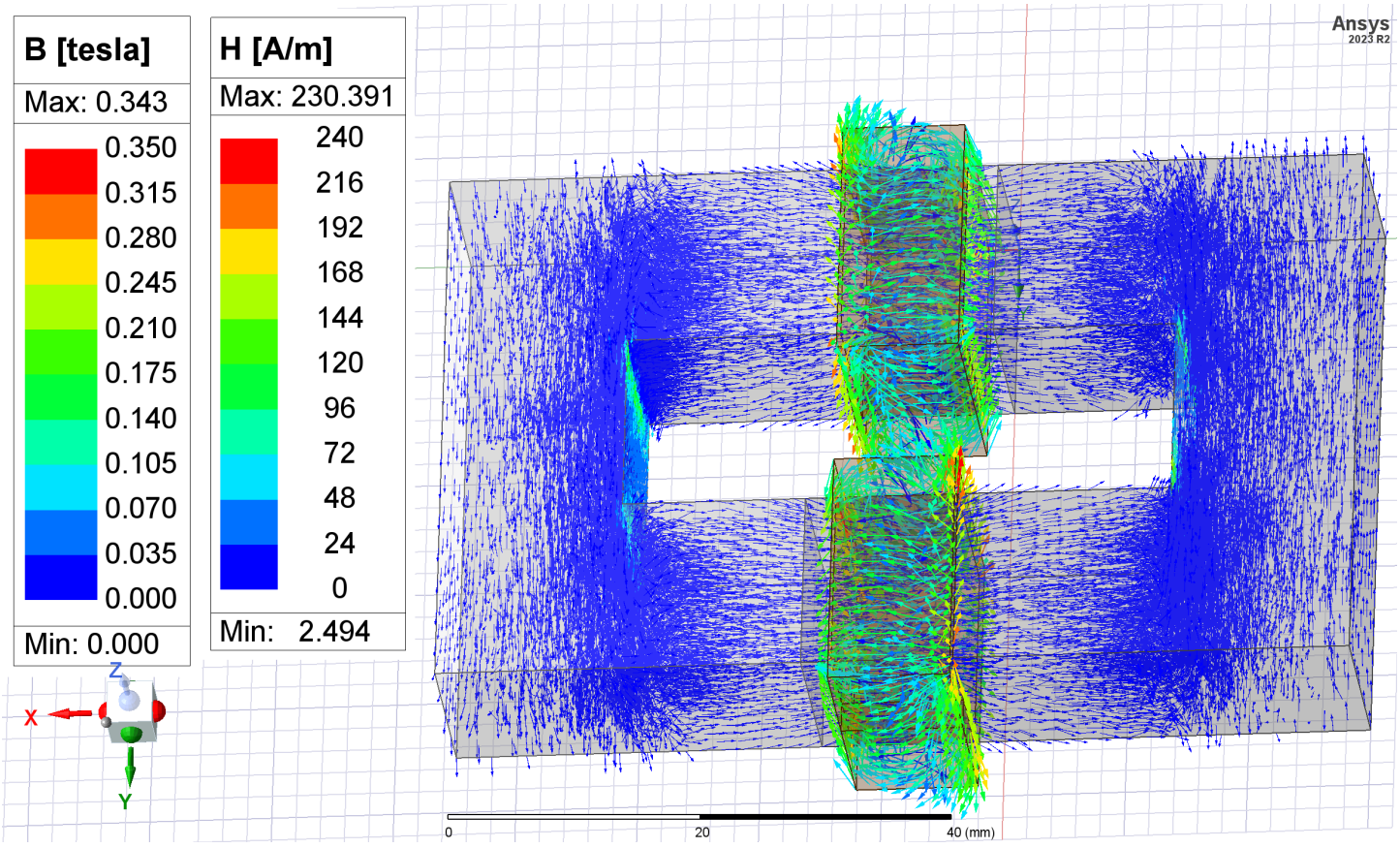
100mA 20turns *((simple design with little waste, but, not so good!))*

SEE Below - laminations appear to be set wrong - turned off - re-simulate - MUCH BETTER!
(this likely applies to the AEDT Student version also)



Results when the material Lamination direction is not set correctly:





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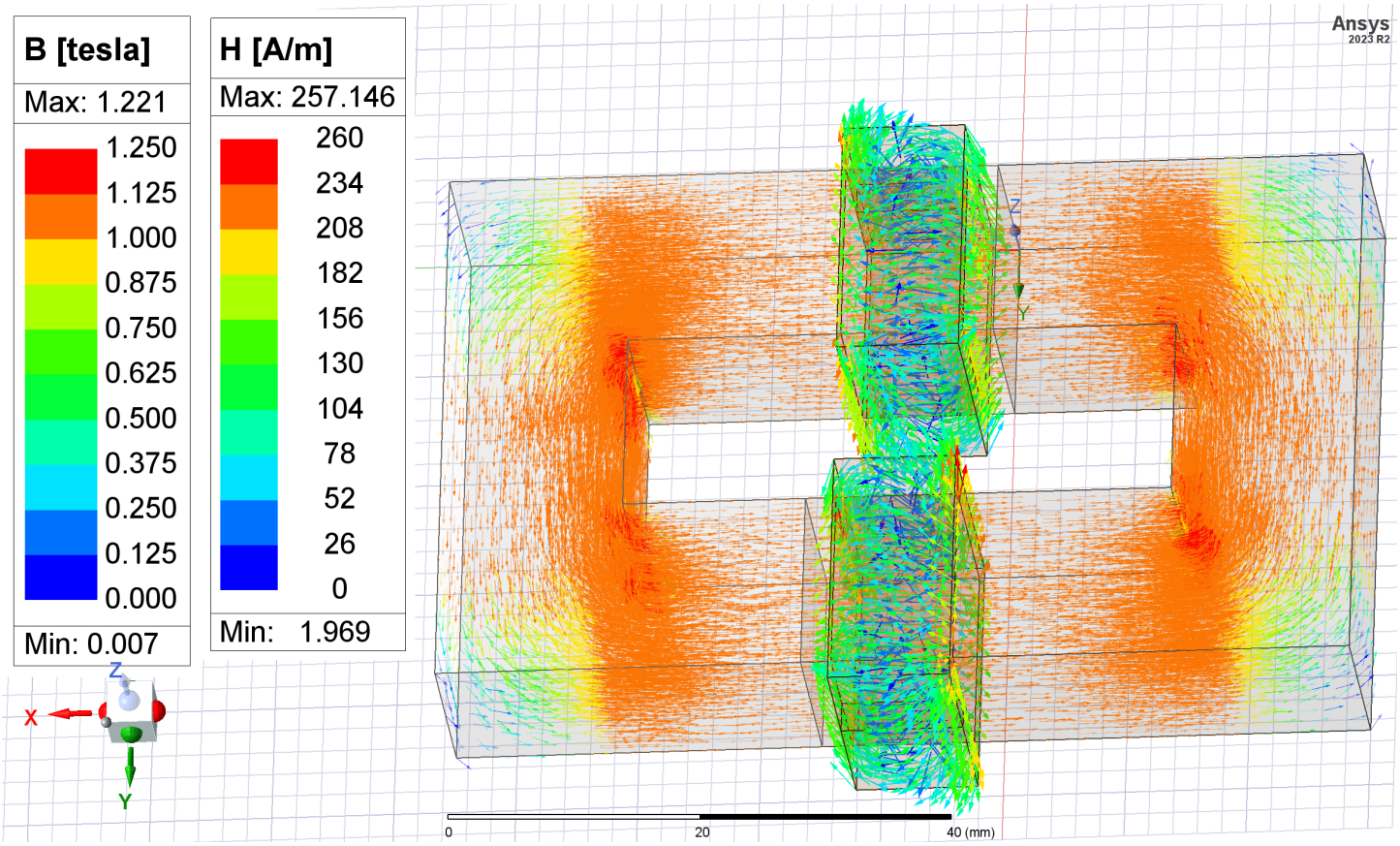
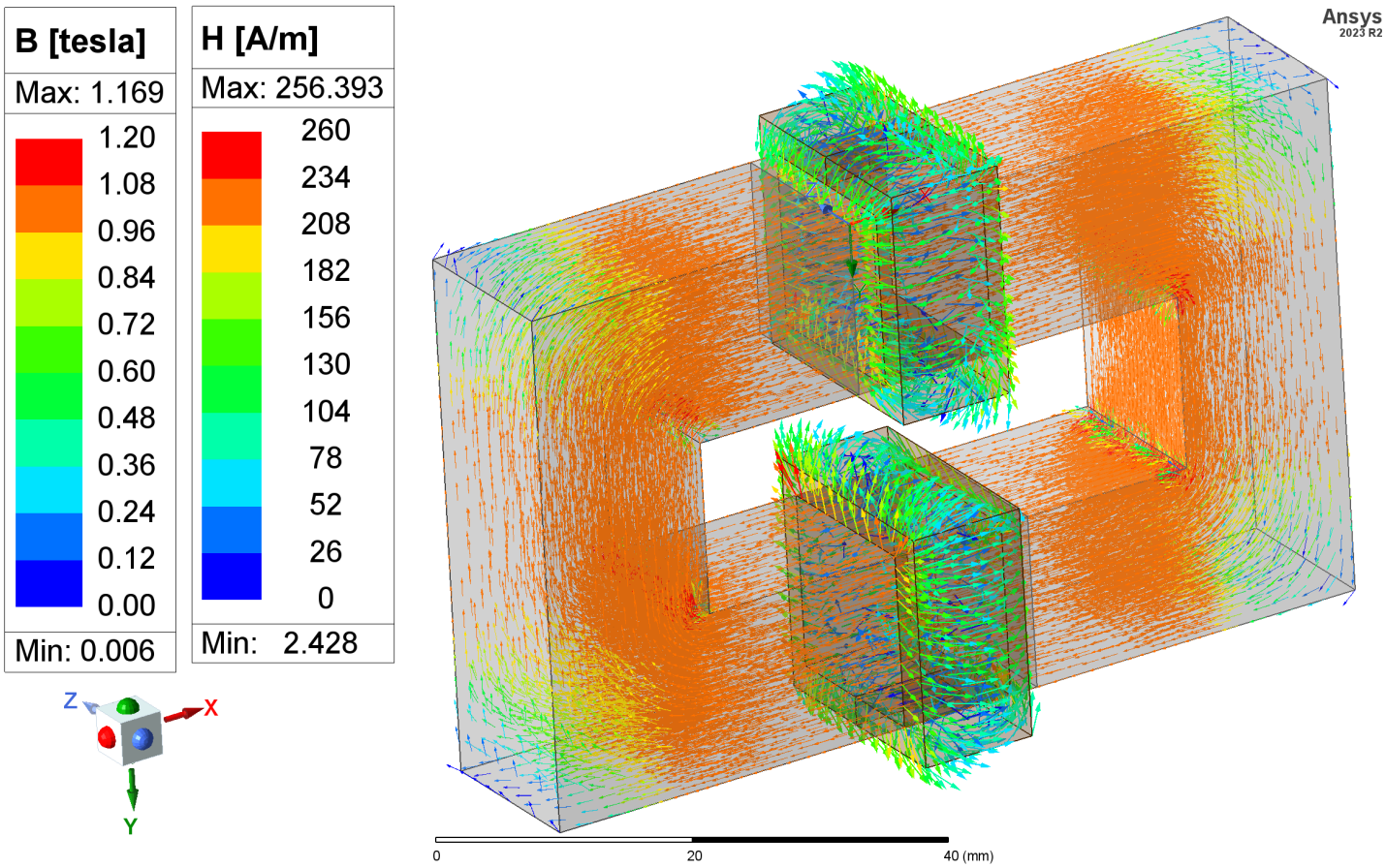
Lamination now turned off - (more study needed) [resolved - read the manual !]:

***** This might work OK ***** **[[100mA 20 turns]]**



NOTE: Set the Lamination Stackin Direction to match the Global CS (in this case V3 or Z direction - came out OK)

Then tried Cosre Loss Model to Electrical Steel - seemed to work (same as above). {Kh, Kc, Ke & Kdc all = to 0}



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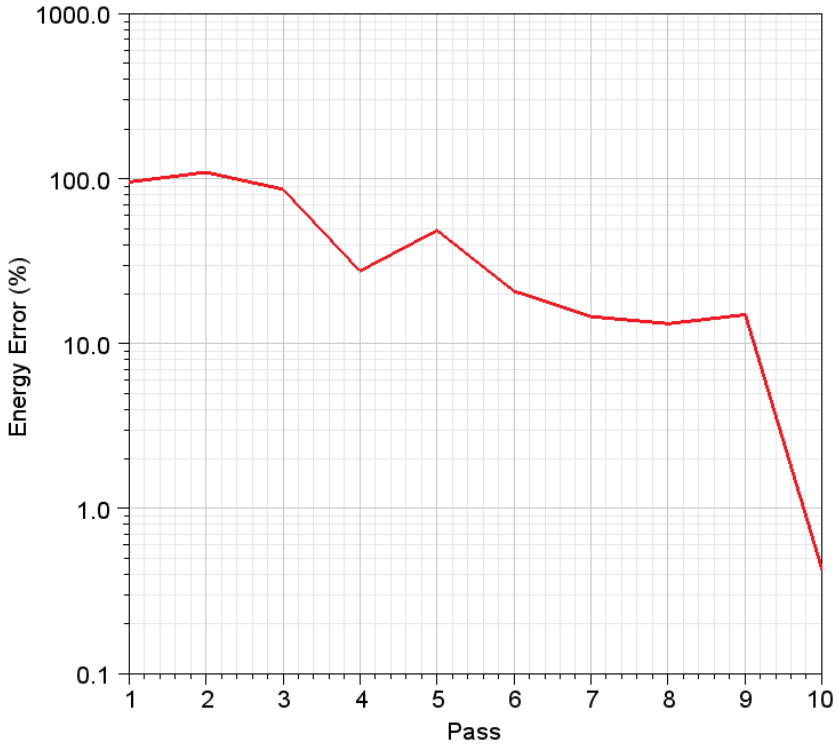
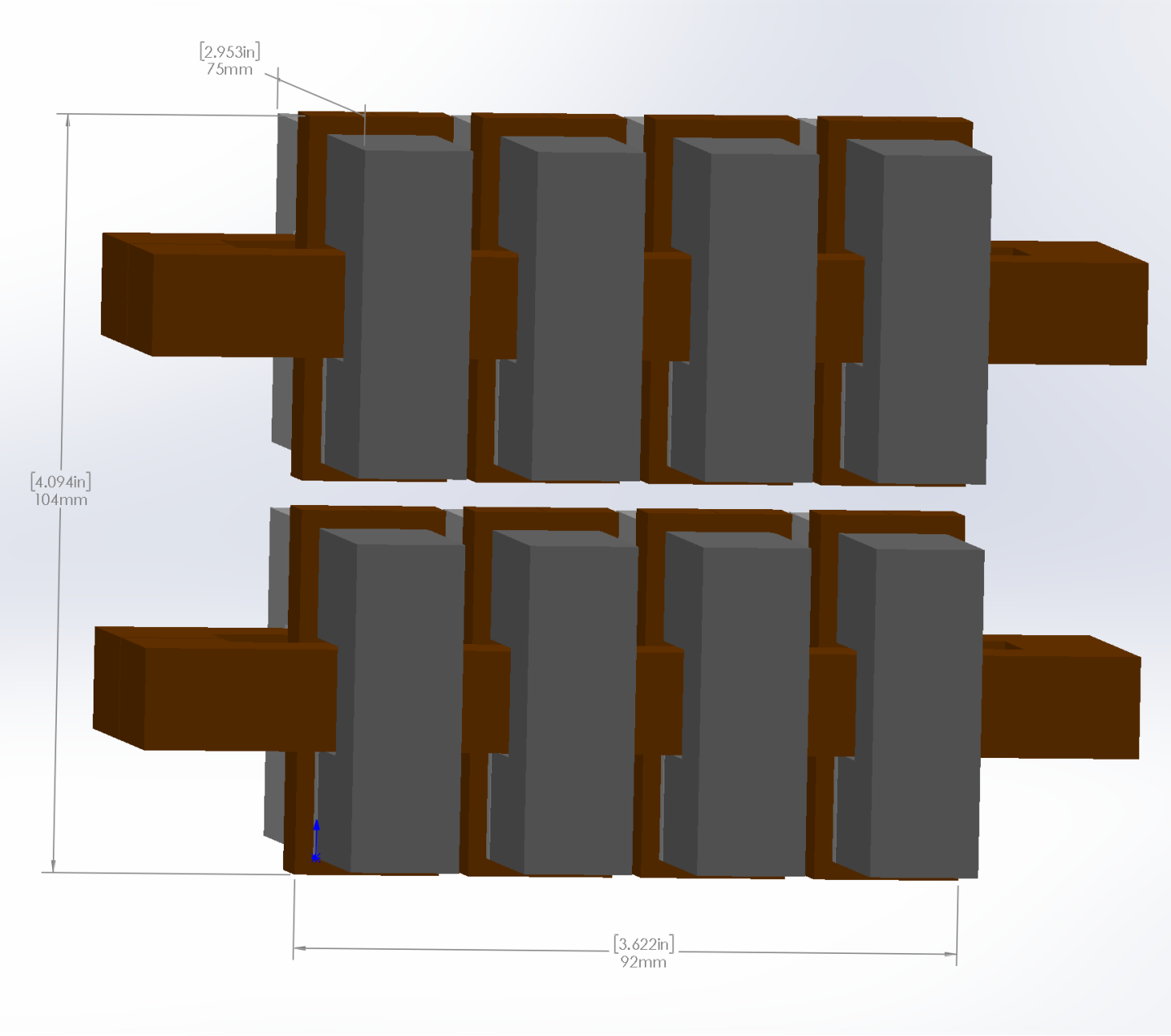
Convergence: (converges to less than 0.5%)

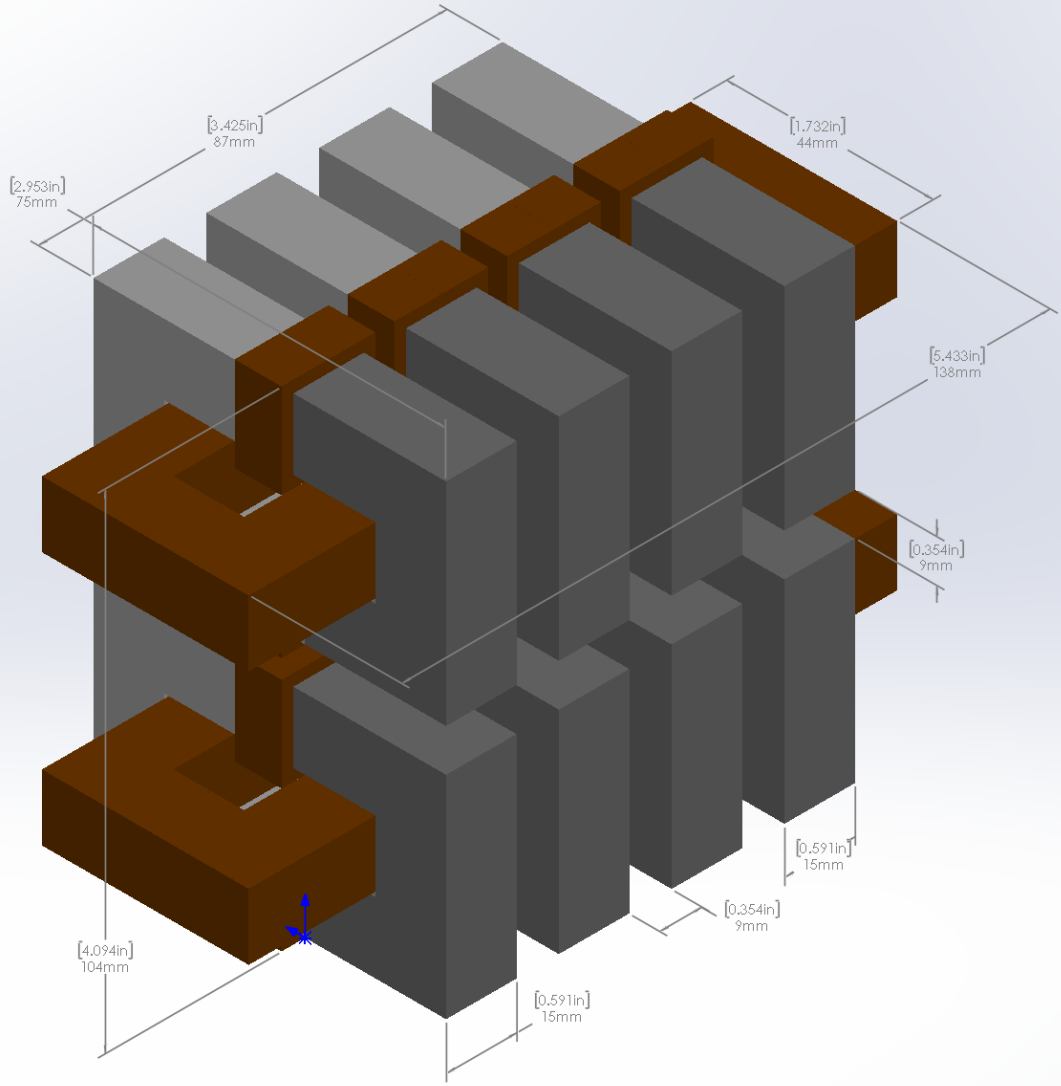


POLE SPACING

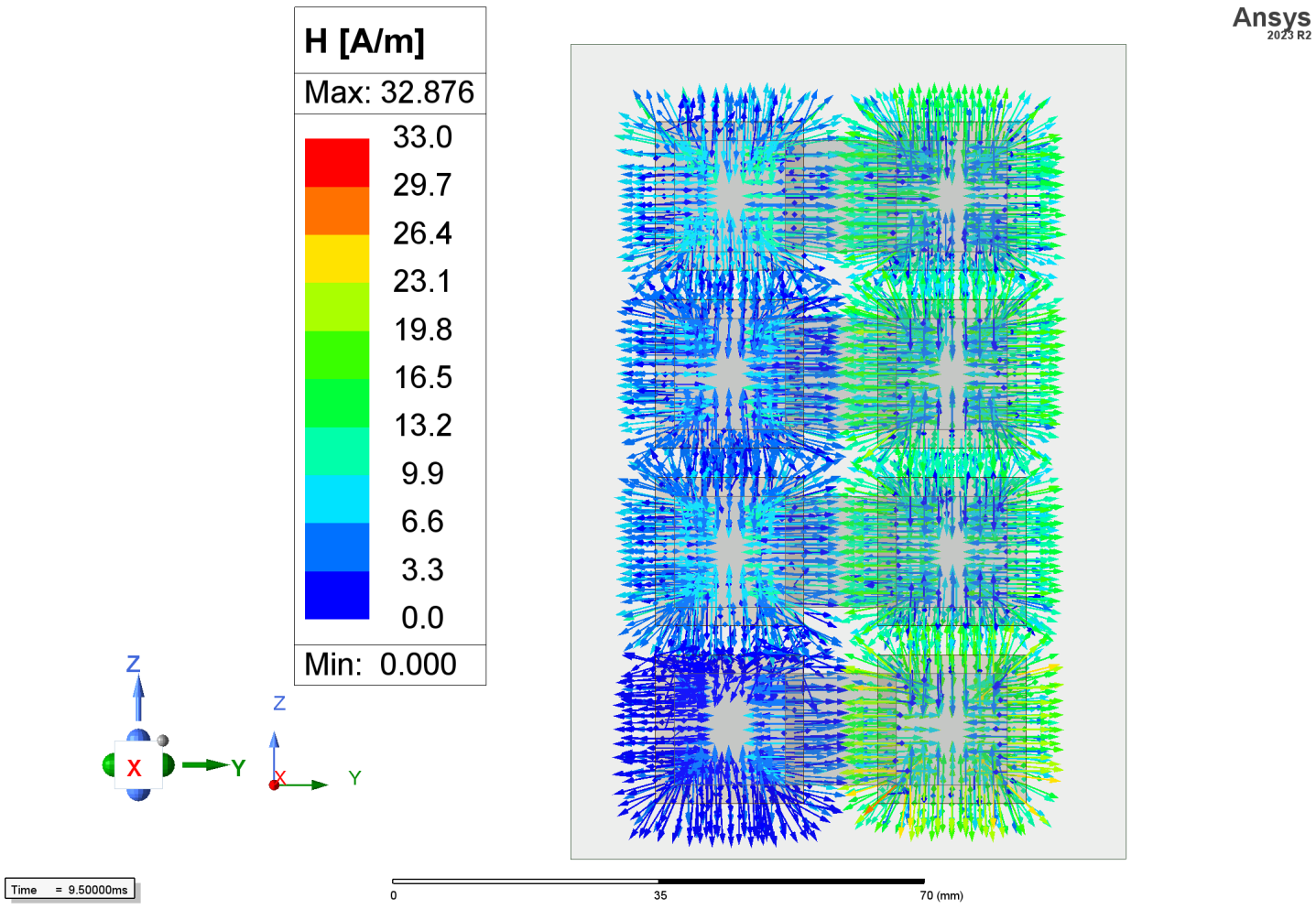
NOTE: This configuration may have failed (don't remember) since the Poles along the Loop were too close together - the adjacent N-N and S-S interfered with each other.

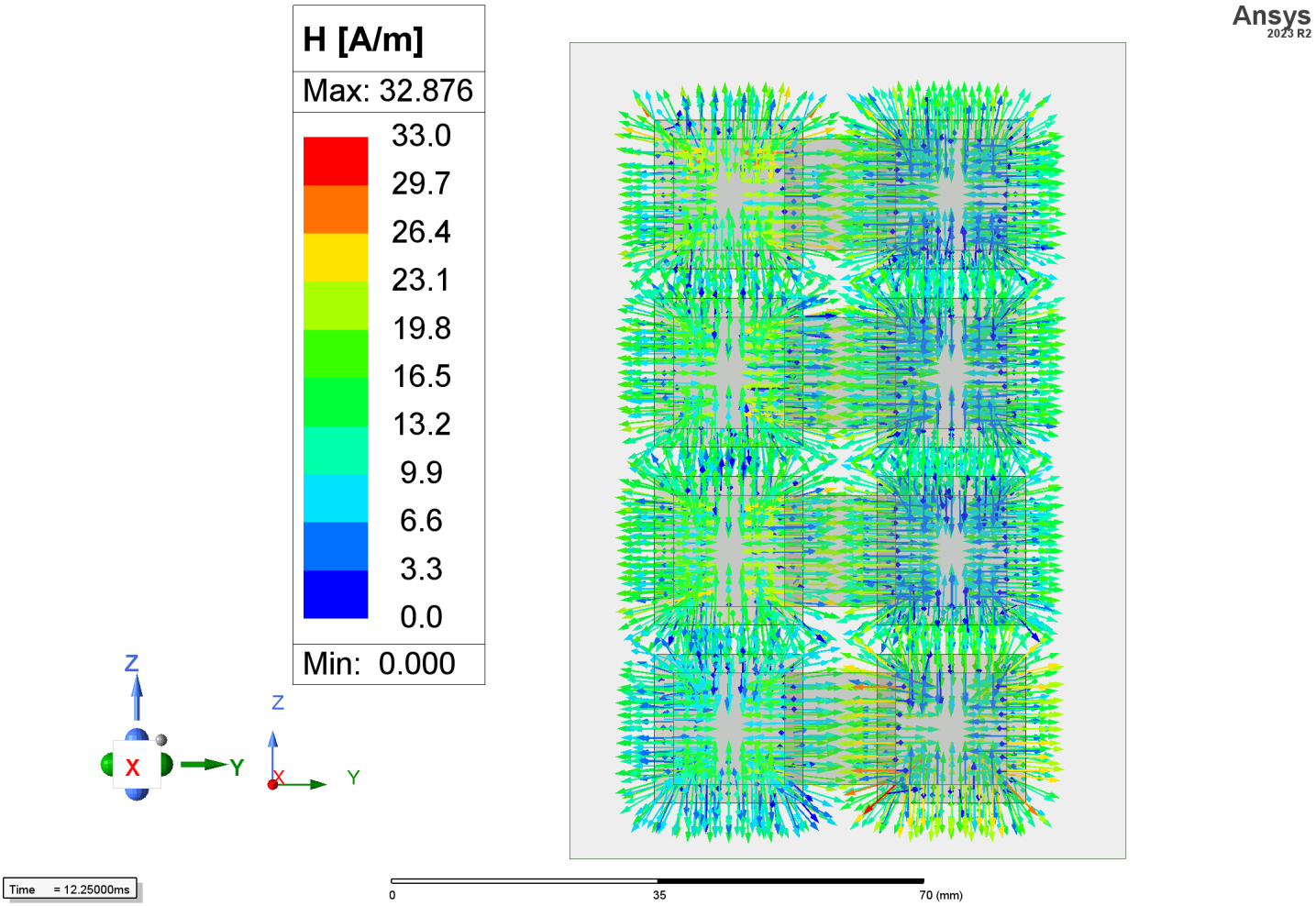
Pole to Pole spacing is about 9mm. This appears to be too close.

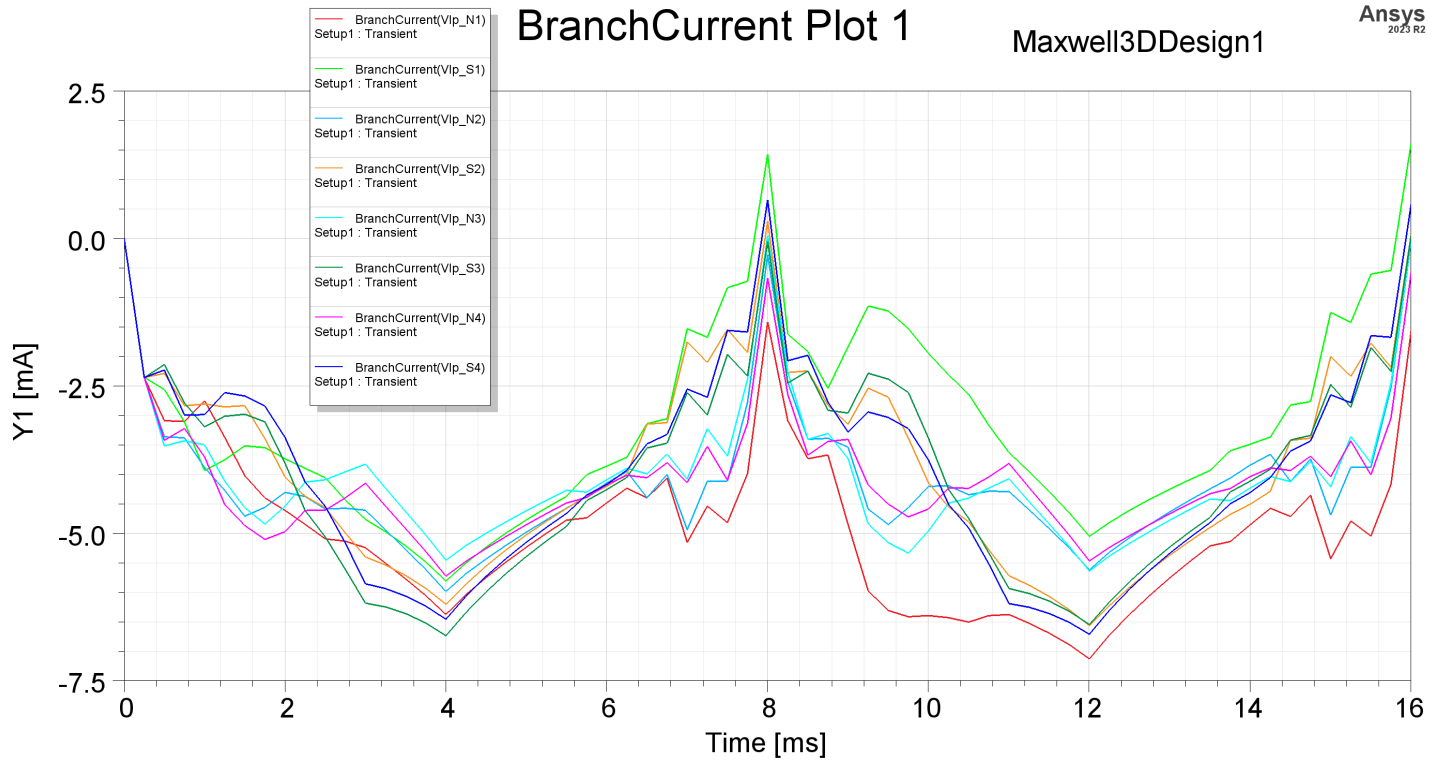


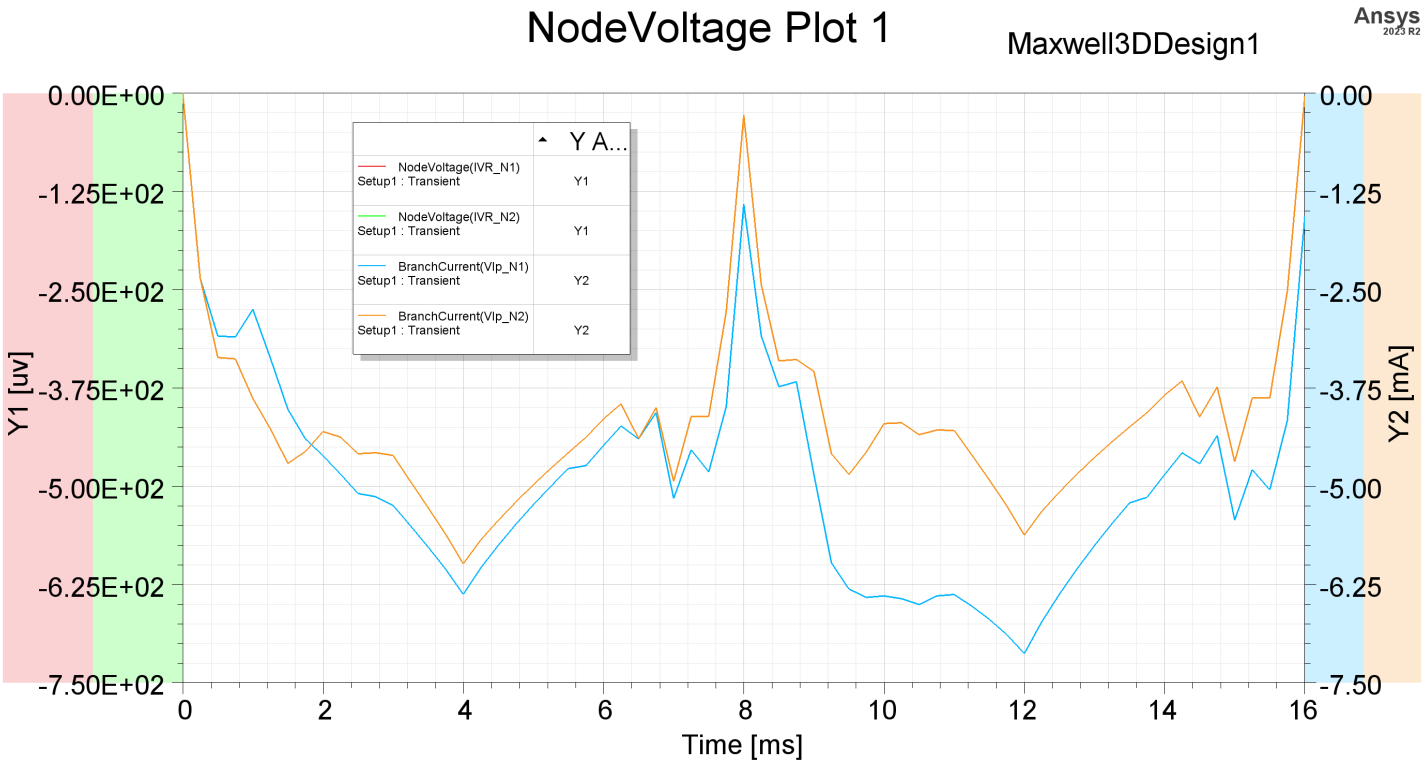

[3.425in]
87mm
[2.953in]
75mm
[1.732in]
44mm
[5.433in]
138mm
[0.354in]
9mm
[0.591in]
15mm
[0.354in]
9mm
[4.094in]
104mm
[0.591in]
15mm

Pole spacing (see along the Z direction) is too close. The adjacent "B" fields interfere with each other:




Ansys
2023 R2
H [A/m]
Max: 32.876
33.0
29.7
26.4
23.1
19.8
16.5
13.2
9.9
6.6
3.3
0.0
Min: 0.000
Z
X
Y
Z
X
Y
Time = 12.25000ms
0
35
70 (mm)


BranchCurrent Plot 1
Maxwell3DDesign1
Ansys
2023 R2
BranchCurrent(Vlp_N1)
Setup1 : Transient
BranchCurrent(Vlp_S1)
Setup1 : Transient
BranchCurrent(Vlp_N2)
Setup1 : Transient
BranchCurrent(Vlp_S2)
Setup1 : Transient
BranchCurrent(Vlp_N3)
Setup1 : Transient
BranchCurrent(Vlp_S3)
Setup1 : Transient
BranchCurrent(Vlp_N4)
Setup1 : Transient
BranchCurrent(Vlp_S4)
Setup1 : Transient
Y1 [mA]
2.5
0.0
-2.5
-5.0
-7.5
0
2
4
6
8
10
12
14
16
Time [ms]



NOTES:

1. The material “Lamination Stack direction” is important. Ensure that the correct direction of lamination is selected [Y1, Y2, or Y3] when analyzing the device. This is set under “Properties, Material, etc.” Otherwise the Analysis might not give proper results!

2. Pole spacing along the Loop is also a consideration as shown above.

SL