Picking up where we left off…

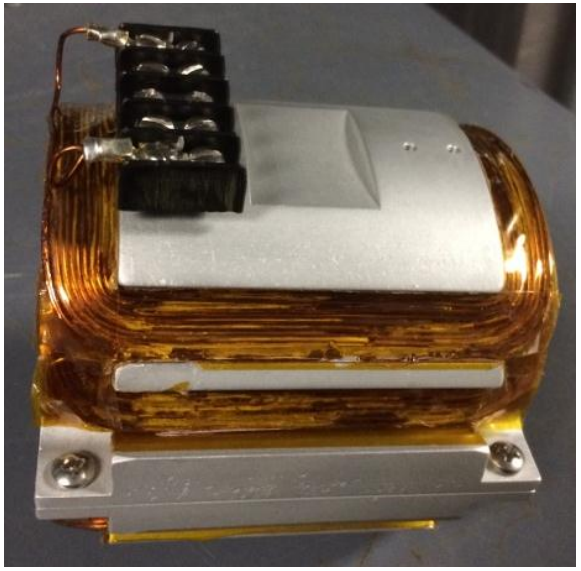
1. ~~Existing ITCU DS should run fine (4.2A, 7V) at 350kV OK, although warm at about 60C.~~
2. Next upgrade: wind new coils on existing fixture w/ AWG16 (~40% improvement).
3. Next upgrade: fab longer fixture+coil. Fractional length of straight > total length of wire.
4. ~~Next upgrade: iron magnet~~

L_DS = 3.94”

L_Chamber = 5.28”

L_new_max = 5.00”

L_new_straight = 2.875”

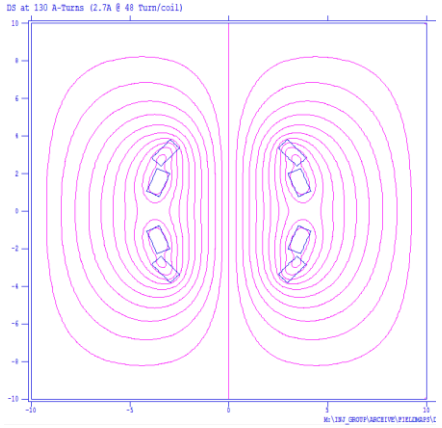


Just lengthening magnet:

- 37% increase in field
- 14% increase in heat

<u>Run @ 3.1A for 350keV and 15 deg and reach ~50C (effective heat of 3.5A)</u>

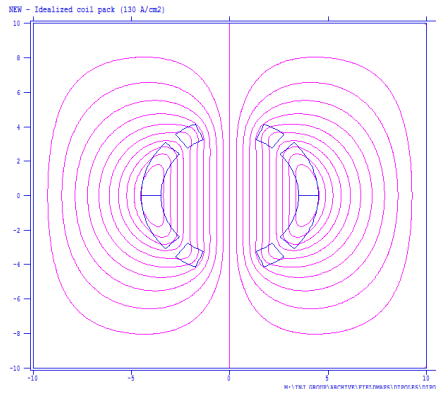
BUT, if we did change coil profile…



As-Found DS, 140-150 A/cm2 => B3/B1 = 1.04%

Field coefficients
Normalization radius = 1.50000
(Bx - iBy) = i[sum n*(An + iBn)/r * (z/r)**(n-1)]

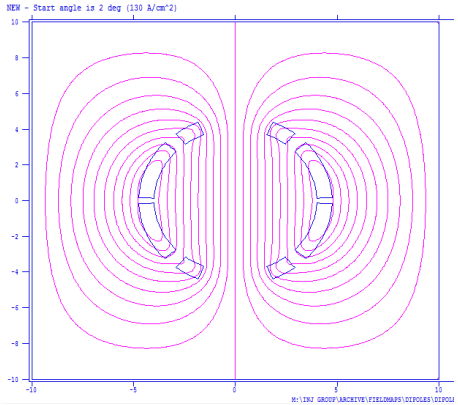
n	n(An)/r	n(Bn)/r	Abs(n(Cn)/r)
1	3.5163E+01	0.0000E+00	3.5163E+01
3	-3.9464E-01	0.0000E+00	3.9464E-01
5	-4.4381E-01	0.0000E+00	4.4381E-01
7	-5.0652E-02	0.0000E+00	5.0652E-02
9	-5.4573E-03	0.0000E+00	5.4573E-03
11	-6.2605E-04	0.0000E+00	6.2605E-04
13	-4.4825E-04	0.0000E+00	4.4825E-04



Ideal, 130 A/cm2 => B1/B1_DS = 2.08, B3/B1 = 0.09%

Field coefficients
Normalization radius = 1.50000
(Bx - iBy) = i[sum n*(An + iBn)/r * (z/r)**(n-1)]

n	n(An)/r	n(Bn)/r	Abs(n(Cn)/r)
1	7.3223E+01	0.0000E+00	7.3223E+01
3	-6.5955E-02	0.0000E+00	6.5955E-02
5	-1.9202E-03	0.0000E+00	1.9202E-03
7	-1.4986E-04	0.0000E+00	1.4986E-04
9	-7.4663E-03	0.0000E+00	7.4663E-03
11	1.2460E-03	0.0000E+00	1.2460E-03
13	1.0491E-04	0.0000E+00	1.0491E-04



2 deg, 130 A/cm2 => B1/B1_DS = 1.45, B3/B1 = 0.74%

Field coefficients
Normalization radius = 1.50000
(Bx - iBy) = i[sum n*(An + iBn)/r * (z/r)**(n-1)]

n	n(An)/r	n(Bn)/r	Abs(n(Cn)/r)
1	5.0952E+01	0.0000E+00	5.0952E+01
3	-3.7744E-01	0.0000E+00	3.7744E-01
5	-4.0250E-02	0.0000E+00	4.0250E-02
7	-4.7491E-03	0.0000E+00	4.7491E-03
9	-3.0419E-03	0.0000E+00	3.0419E-03
11	3.0743E-04	0.0000E+00	3.0743E-04
13	1.0589E-04	0.0000E+00	1.0589E-04

Again, from last time…

1. ~~Existing ITCU DS should run fine (4.2A, 7V) at 350kV OK, although warm at about 60C.~~
2. Next upgrade: wind new coils on existing fixture w/ AWG16 (~40% improvement).
3. Next upgrade: fab longer fixture+coil. Fractional length of straight > total length of wire.
4. ~~Next upgrade: iron magnet~~

Today's conclusions…

1. Evaluate existing "short" fixture with AWG16 and larger coil package => means same fixture
2. Evaluate #1, but stretch to "long" => means longer fixture w/ same cross-section
3. Mechanically optimize "long" new cross-section => means entirely new fixture