EFFECT OF A STEP IN CONDUCTOR THICKNESS ON THE FIELD QUALITY OF THE SSC RING DIPOLE MAGNETS.

Robert B. Meuser
Consultant
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The effect of a stepwise change in the thickness of the conductor, as might be caused by stopping and re-starting the cabling machine or a readjustment of the turkshead, is considered.

A step occuring anywhere in the coil affects the positions of all the conductors. A step occuring near the middle of the winding has the greatest effect on the lower-order multipoles; the effect of step position on the higher-order is more random. For an integer number of turns, half of the multipoles are zero because of the symmetry; for an odd number of half turns all multupoles are affected.

The analysis was performed for a step after each half turn, but results are presented only for the maximum absolute values for each multipole. There is a chance that the maximum for a particular multipole occurs for a step located at a position other than an integer number of half-turns. Any multipoles that appear to be anonomously small are suspect for that reason. The variation of multipole magnitude with multipole order exhibits the typical sawtooth characteristic.

NORMALIZED SENSITIVIES: (DIPOLE FIELD/10000) FOR A STEP OF 0.001 in.
REFERENCE RADIUS (meters): 0.01

FOR EACH LAYER:

NO. OF POLE PAIRS, N	SKEW (REAL) MAX A	NORMAL (IMAGINARY) MAX B	LOCATION (COND. NO.) MAX A	MAX B
********** LAYER NO. 1 **********				
1	.626660	3.465798	.5	9.0
2	1.618338	.419098	5.0	15.5
3	.156500	1.874618	15.5	7.0
4	.670149	.087876	10.0	.5
5	.032125	.190254	12.5	4.0
6	.108766	.013909	7.0	7.5
7	.006948	.025801	8.5	9.0
8	.014523	.002628	5.0	5.5
9	.001144	.004120	7.5	7.0
10	.001960	.000603	4.0	8.5
11	.000256	.000772	9.5	6.0
12	.000397	.000133	11.0	3.5
13	.000061	.000307	4.5	11.0
14	.000192	.000035	6.0	15.5
15	.000024	.000096	15.5	7.0
16	.000038	.000013	10.0	.5
17	.000004	.000048	1.5	10.0
18	.000024	.000002	11.0	.5

**********LAYER NO. 2 **********

1	.500866	2.225853	.5	12.0
2	1.780712	.208015	9.0	19.5
3	.059369	.890626	.5	11.0
4	.084917	.025500	15.0	.5
5	.008154	.093629	19.5	9.0
6	.024776	.002572	12.0	.5
7	.000605	.005443	16.5	6.0
8	.002057	.000218	10.0	10.5
9	.000062	.000404	12.5	13.0
10	.000123	.000020	7.0	.5
11	.000007	.000034	10.5	4.0
12	.000013	.000002	6.0	.5
13	.000001	.000004	19.5	15.0
14	.000002	.000000	6.0	.5
15	.000000	.000000	2.5	8.0
16	.000000	.000000	5.0	19.5
17	.000000	.000000	15.5	15.0
18	.000000	.000000	4.0	4.5

FOR ENTIRE MAGNET:

NO. OF POLE PAIRS, N	SKEW (REAL) MAX A	NORMAL (IMAGINARY) MAX B	LOCATION A LAYER	LOCATION A TURN	LOCATION B LAYER	LOCATION B TURN
1	.626660	3.465798	1.0	.5	1.0	9.0
2	1.780712	.419098	2.0	9.0	1.0	15.5
3	.156500	1.874618	1.0	15.5	1.0	7.0
4	.670149	.087876	1.0	10.0	1.0	.5
5	.032125	.190254	1.0	12.5	1.0	4.0
6	.108766	.013989	1.0	7.0	1.0	7.5
7	.006948	.025801	1.0	8.5	1.0	9.0
8	.014523	.002628	1.0	5.0	1.0	5.5
9	.001144	.004120	1.0	7.5	1.0	7.0
10	.001960	.000603	1.0	4.0	1.0	8.5
11	.000256	.000772	1.0	9.5	1.0	6.0
12	.000397	.000133	1.0	11.0	1.0	3.5
13	.000061	.000307	1.0	4.5	1.0	11.0
14	.000192	.000035	1.0	6.0	1.0	15.5
15	.000024	.000096	1.0	15.5	1.0	7.0
16	.000038	.000013	1.0	10.0	1.0	.5
17	.000004	.000048	1.0	1.5	1.0	10.0
18	.000024	.000002	1.0	11.0	1.0	.5

Notes: Location of the maximum (conductor number) is counted from the midplane toward the pole. The magnet cross section analyzed is C358a.