

DSA324 Transfer Function Using Rawson Lush Field meter

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9/6/91 TS-SSC 91-174

The inner coils of DSA323 and DSA324 are both from the cable reel 3-S-00021. The dipole field strength on DSA324 was measured with a Rawson Lush -789 field meter. This is a rotating probe of 1/4 inch in length . The analog output from the probe meter is proportional to the field strength and it is used to interpret the transfer function .

The rotating probe was inserted into the warm bore with no current on the magnet .The magnet was cold at 4.2 K, 1 atmosphere. Once the probe was at the center of the magnet, the magnet was slowly (16 A/s) ramped to ~5000 A and a reading was taken at every ~500 A interval . A total of 13 channels with cryogenic information, magnet current and probe voltage reading were monitored using Keithley scanner . Magnet current reading was taken at the begining and end of a ~30 second scan and was readout by HP3457A DVM .

Figure 1 (data Table 1) shows the measured transfer functions at the magnet center for different current values. The measured cold mass transfer function at 5 kA for DSA323 was 1.033 T/kA . Transfer function for DSA324 at 5.01706 kA is 1.037 T/kA , which makes it slightly higher than DSA323 and a little lower than predicted value of 1.040 T/kA (yellow book).

Dipole field measurment using Rawson Lush fieldmeter as a function of position is shown in Figure 2 (data Table 2) . For field measurement with Morgan coil see S.Delchamps TS-SSC memo. Here is a sample measurement using Morgan coil (HAL2, Magnetometer) and Rawson Lush probe.

	<u>Position(cm)</u>	<u>Magnet current (A)</u>	<u>Transfer Function(Tesla/kA)</u>
<u>Magnetometer</u>	0.0 (center)	5059.805	1.0333
	+30.48 (Lead End)	5053.182	1.0353
	-30.48 (Ret. End)	5055.585	1.0223

<u>Position(cm)</u>	<u>Magnet current (A)</u>	<u>Transfer Function(Tesla/kA)</u>
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	<u>Position(cm)</u>	<u>Magnet current (A)</u>	<u>Transfer Function(Tesla/kA)</u>
<u>HAL2</u>	0.0	5003.333	1.0313
	+30.48	5002.00	1.0328
	-30.48	5003.00	1.0253
<u>Rawson Lush</u>	0.0	5017.059	1.0368
	+30.36	5015.045	1.0355
	-30.12	5017.612	1.0280

Table 1

R.Lush Data at magnet center

Tesla	Imagnet(A)	Trans. Fcn
0.51230	489.09990	1.047
1.04330	997.69530	1.046
1.04600	998.16280	1.048
1.55670	1488.20370	1.046
1.55110	1483.81010	1.045
2.05600	1970.65930	1.043
2.57100	2462.70700	1.044
2.57900	2464.77120	1.046
3.11900	2979.60910	1.047
3.12400	2975.56740	1.050
3.64600	3475.18460	1.049
4.17100	3985.44430	1.047
4.63300	4436.84280	1.044
5.04800	4870.53910	1.036
5.06300	4861.63820	1.041
5.29400	5109.28030	1.036
5.29800	5116.02390	1.036
5.28600	5104.48540	1.036

DSA324 Transfer Function Vs Magnet Current

(Rawson Lush Fieldmeter measurement)

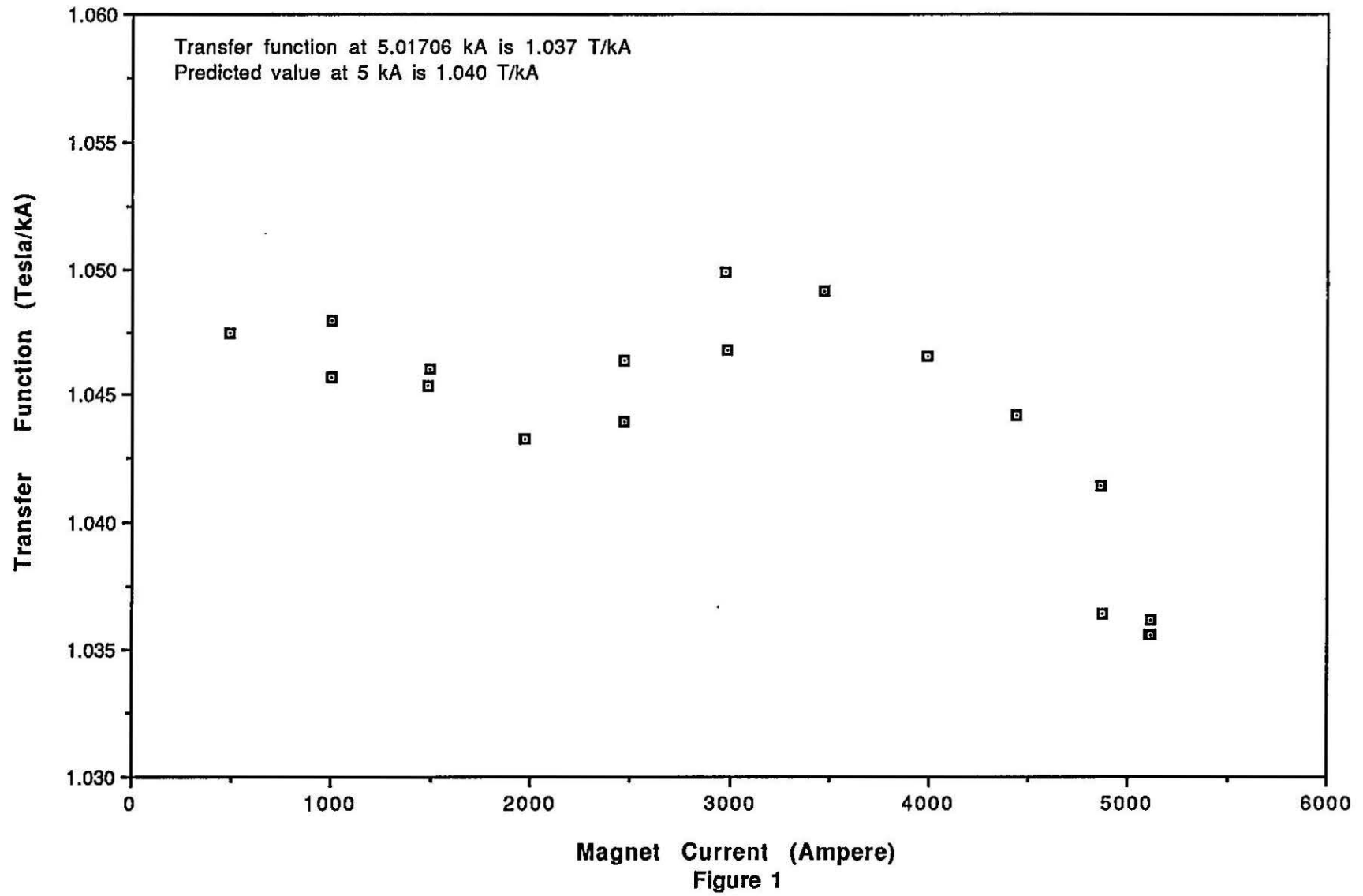


Table 2

DSA324-Zscan with Rawson Lush

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	Position(cm)	Transf Fcn	x1 Tesla	Imag(kA)		Position(cm)	Transf Fcn	x1 Tesla	Imag(kA)
1	-0.11083	1.03745	5.20100	5.01328		-1.66235	1.03718	5.20100	5.01454
2	107.55320	0.01615	0.08100	5.01651		-3.38009	1.03656	5.20100	5.01758
3	105.89090	0.03749	0.18800	5.01469		-5.04243	1.03669	5.19900	5.01501
4	104.22860	0.07155	0.35900	5.01731		-6.64936	1.03701	5.20200	5.01633
5	102.62170	0.12623	0.63300	5.01472		-8.36710	1.03631	5.19800	5.01587
6	101.01470	0.18701	0.93800	5.01585		-10.02944	1.03669	5.19900	5.01499
7	99.29697	0.24843	1.24600	5.01557		-11.69179	1.03644	5.19900	5.01621
8	97.69003	0.31368	1.57300	5.01464		-13.35412	1.03556	5.19500	5.01663
9	96.02771	0.38996	1.95600	5.01586		-15.01646	1.03595	5.19500	5.01473
10	94.30995	0.47582	2.38700	5.01659		-16.73420	1.03518	5.19400	5.01749
11	92.59219	0.56336	2.82500	5.01458		-18.39654	1.03474	5.18900	5.01476
12	90.87447	0.64378	3.23000	5.01724		-20.05887	1.03510	5.19200	5.01595
13	89.26752	0.71349	3.57800	5.01479		-21.77663	1.03196	5.17600	5.01571
14	87.60520	0.76658	3.84500	5.01579		-23.38356	1.03173	5.17400	5.01485
15	85.88744	0.80350	4.03000	5.01553		-25.10130	1.03068	5.17000	5.01611
16	84.22510	0.82616	4.14300	5.01478		-26.81906	1.02976	5.16600	5.01668
17	82.45194	0.84088	4.21500	5.01258		-28.53680	1.02897	5.16000	5.01473
18	80.73420	0.85250	4.27400	5.01347		-30.19914	1.02798	5.15800	5.01761
19	79.07185	0.86546	4.33600	5.01007		-31.91689	1.02737	5.15200	5.01476
20	77.35411	0.87817	4.40600	5.01725		-33.57922	1.02772	5.15500	5.01597
21	75.69177	0.89533	4.49000	5.01492		-35.24156	1.02715	5.15200	5.01582
22	74.08485	0.91367	4.58300	5.01604		-36.90390	1.02652	5.14800	5.01499
23	72.36710	0.93330	4.68100	5.01554		-38.56624	1.02605	5.14700	5.01631
24	70.81558	0.95199	4.77400	5.01476		-40.28399	1.02510	5.14300	5.01705
25	69.04241	0.96830	4.85700	5.01601		-41.94633	1.02613	5.14600	5.01497
26	67.38008	0.98212	4.92700	5.01670		-43.60866	1.02498	5.14300	5.01764
27	65.71774	0.99405	4.98500	5.01481		-45.32641	1.02553	5.14300	5.01498
28	64.00000	1.00237	5.02700	5.01509		-46.93334	1.02466	5.14000	5.01628
29	62.28224	1.00951	5.05800	5.01037		-48.65109	1.02296	5.13100	5.01583
30	60.67532	1.01216	5.07700	5.01599		-50.36884	1.02491	5.14000	5.01505
31	58.90216	1.01540	5.09300	5.01573		-52.03118	1.02311	5.13200	5.01608
32	57.29523	1.01897	5.11000	5.01487		-53.74893	1.02255	5.13000	5.01686
33	55.52207	1.02111	5.12200	5.01612		-55.41126	1.02374	5.13400	5.01495
34	53.74891	1.02316	5.13300	5.01679		-57.12901	1.02301	5.13300	5.01754
35	52.08657	1.02594	5.14500	5.01490		-58.79135	1.02230	5.12700	5.01514
36	50.36883	1.02680	5.15200	5.01754		-60.45369	1.02208	5.12700	5.01624
37	48.70649	1.02910	5.16100	5.01506		-62.17144	1.02173	5.12500	5.01600
38	47.15497	1.03469	5.19000	5.01601		-63.83377	1.02269	5.12900	5.01522
39	45.38182	1.03491	5.19100	5.01589		-65.49611	1.02346	5.13400	5.01630
40	43.83030	1.03511	5.19100	5.01494		-67.15845	1.02238	5.12900	5.01670
41	42.11256	1.03503	5.19200	5.01626		0.00000	1.03665	5.20100	5.01711
42	40.39480	1.03492	5.19200	5.01680		0.00000	1.03686	5.20200	5.01706

	Position(cm)	Transf Fcn	x1 Tesla	Imag(kA)		Position(cm)	Transf Fcn	x1 Tesla	Imag(kA)
43	38.73246	1.03553	5.19300	5.01481		0.00000	1.03687	5.20200	5.01700
44	37.07013	1.03475	5.19200	5.01765					
45	35.35238	1.03549	5.19300	5.01499					
46	33.74545	1.03523	5.19300	5.01626					
47	32.02770	1.03549	5.19400	5.01597					
48	30.36536	1.03548	5.19300	5.01504					
49	28.64762	1.03523	5.19300	5.01629					
50	26.87445	1.03512	5.19300	5.01679					
51	25.21212	1.03611	5.19600	5.01490					
52	23.49437	1.03575	5.19700	5.01764					
53	21.83203	1.03668	5.19900	5.01502					
54	20.22511	1.03666	5.20000	5.01613					
55	18.50735	1.03670	5.20000	5.01591					
56	16.90042	1.03648	5.19800	5.01507					
57	15.18268	1.03583	5.19600	5.01628					
58	13.52034	1.03639	5.19600	5.01354					
59	11.85801	1.03706	5.19600	5.01031					
60	10.14025	1.03767	5.20400	5.01508					
61	8.47792	1.03887	5.20500	5.01026					
62	6.81558	1.03685	5.20100	5.01617					
63	5.09784	1.03692	5.20100	5.01581					
64	3.49091	1.03823	5.20200	5.01047					
65	1.71774	1.03730	5.20000	5.01301					
66	0.00000	1.03657	5.20000	5.01652					

DSA324 Dipole with Rawson Lush Probe

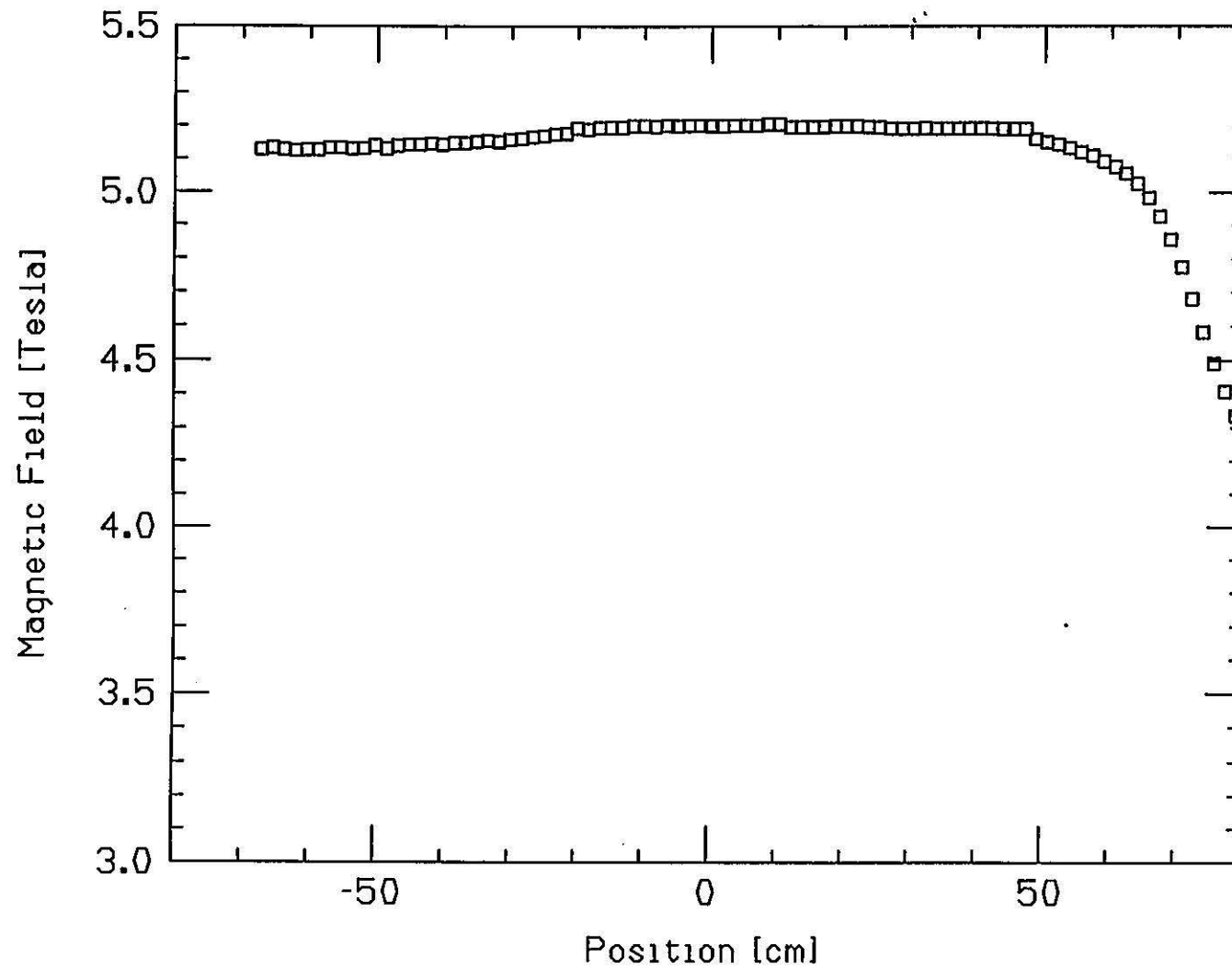


Figure 2