

Physical

	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B
h	6,00	6,00	6,00	6,00	6,00	6,00
ζ	125,26	125,26	125,26	125,26	125,26	125,26
ξ	-120,00	120,00	0,00	-120,00	120,00	0,00
x/h	-0,577	-0,577	-0,577	-0,577	-0,577	-0,577
y/h	-0,707	0,707	0,000	-0,707	0,707	0,000
z/h	0,408	0,408	-0,817	0,408	0,408	-0,817
h	6,00	6,00	6,00	6,00	6,00	6,00
θ	65,90	65,90	144,74	65,90	65,90	144,74
φ	230,77	129,23	180,00	230,77	129,23	180,00
	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B

Oswald06/ASAP-LF

	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B
h	0,99	1,21	0,83	0,98	1,18	0,84
ζ	123,50	117,10	128,30	123,30	117,40	127,20
ξ	-137,20	125,80	15,00	-135,40	125,20	13,30
x/h	-0,552	-0,456	-0,620	-0,549	-0,460	-0,605
y/h	-0,567	0,722	0,203	-0,587	0,725	0,183
z/h	0,612	0,521	-0,758	0,595	0,512	-0,775
h	0,99	1,21	0,83	0,98	1,18	0,84
θ	52,28	58,62	139,29	53,48	59,22	140,82
φ	225,75	122,25	161,85	226,91	122,39	163,14
	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B

Oswald09/ASAP-LF

	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B
h	1,36	1,66	1,10	1,36	1,66	1,10
ζ	120,20	115,20	125,70	120,20	115,20	125,70
ξ	-135,80	127,50	15,90	-135,80	127,50	15,90
x/h	-0,503	-0,426	-0,584	-0,503	-0,426	-0,584
y/h	-0,603	0,718	0,222	-0,603	0,718	0,222
z/h	0,620	0,551	-0,781	0,620	0,551	-0,781
h	1,36	1,66	1,10	1,36	1,66	1,10
θ	51,71	56,58	141,35	51,71	56,58	141,35
φ	230,14	120,67	159,13	230,14	120,67	159,13
	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B

Oswald09/CONCEPT-LF

	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B
h	1,35	1,66	1,09	1,35	1,66	1,09
ζ	119,90	114,40	124,70	119,90	114,40	124,70
ξ	-135,30	127,30	15,50	-135,30	127,30	15,50
x/h	-0,498	-0,413	-0,569	-0,498	-0,413	-0,569
y/h	-0,610	0,724	0,220	-0,610	0,724	0,220
z/h	0,616	0,552	-0,792	0,616	0,552	-0,792
h	1,35	1,66	1,09	1,35	1,66	1,09
θ	51,96	56,51	142,40	51,96	56,51	142,40
φ	230,73	119,69	158,90	230,73	119,69	158,90
	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B

Oswald09/rheo-LF

	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B
h	1,34	1,69	1,13	1,34	1,69	1,13
ζ	121,30	115,10	125,30	121,30	115,10	125,30
ξ	-135,40	126,80	16,40	-135,40	126,80	16,40
x/h	-0,520	-0,424	-0,578	-0,520	-0,424	-0,578
y/h	-0,600	0,725	0,230	-0,600	0,725	0,230
z/h	0,608	0,542	-0,783	0,608	0,542	-0,783
h	1,34	1,69	1,13	1,34	1,69	1,13
θ	52,53	57,15	141,53	52,53	57,15	141,53
φ	229,11	120,33	158,26	229,11	120,33	158,26
	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B

Bale08/Graz-LF

	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B
h	1,17	1,44	0,97	1,17	1,44	0,97
ζ	120,20	114,50	124,50	120,20	114,50	124,50
ξ	-135,00	127,10	15,50	-135,00	127,10	15,50
x/h	-0,503	-0,415	-0,566	-0,503	-0,415	-0,566
y/h	-0,611	0,726	0,220	-0,611	0,726	0,220
z/h	0,611	0,549	-0,794	0,611	0,549	-0,794
h	1,17	1,44	0,97	1,17	1,44	0,97
θ	52,33	56,71	142,58	52,33	56,71	142,58
φ	230,54	119,74	158,75	230,54	119,74	158,75
	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B

Antenna Parameter Definitions

(h, ζ, ξ) length and angles in the frame described in [1]. These definitions are recalled here:
 ζ = colatitude from +X S/C axis
 ξ = azimuth from -Z S/C axis

(x, y, z) cartesian coordinates of antenna vector in S/C frame

(h, θ, φ) spherical coordinates of antenna vector in S/C frame (length, colatitude, azimuth)

Macher07/ASAP-LF

	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B
h	1,18	1,43	0,96	1,18	1,43	0,96
ζ	119,80	114,30	124,40	119,80	114,30	124,40
ξ	-135,10	127,40	15,20	-135,10	127,40	15,20
x/h	-0,497	-0,412	-0,565	-0,497	-0,412	-0,565
y/h	-0,613	0,724	0,216	-0,613	0,724	0,216
z/h	0,615	0,554	-0,796	0,615	0,554	-0,796
h	1,18	1,43	0,96	1,18	1,43	0,96
θ	52,07	56,39	142,77	52,07	56,39	142,77
φ	230,95	119,61	159,05	230,95	119,61	159,05
	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B

Macher07/ASAP-OF

Antenna Parameters for the S/Waves experiment

Content:

page 1: summary of published antenna parameters, presented by study (see reference list).
 page 2: summary of published antenna parameters, presented by antenna and spacecraft.

NB1: Numbers in italic for STEREO-B antennas were not modeled in the corresponding study. They have been replaced by the corresponding values that can be found in that study for STEREO-A.

NB2: In several studies, the antenna parameters were computed for LF or OF only.

Abbreviations:

ASAP: *Antenna Scatterers Analysis Program* was originally written by JW McCormack on the basis of a code developed by JH Richmond, Ohio State University.

LF/OF: Loaded Feeds / Open Feeds

CONCEPT: *C*ODE for the *N*umerical *C*omputation of *E*lectromagnetic *P*rocesses for *t*hin *w*ire and *t*hin *s*hell *s*tructures is a program developed at the Department of Theoretical Electrical Engineering of the Technical University Hamburg-Harburg.

rheo: rheometric modeling.

Reference:

- [1] S. Bale, et al. The electric antennas for the STEREO/Waves experiment. *Space Sci. Rev.*, 136 (1–4):529–547, 2008.
- [2] W. Macher, et al. Rheometry of multi-port spaceborne antennas including mutual antenna capacitances and application to STEREO/WAVES. *Meas. Sci. Technol.*, 18:3731–3742, 2007.
- [3] T. Oswald, et al. Numerical analysis of the STEREO/Waves antennas: First results. In H. Rucker, W. Kurth, and G. Mann, editors, *Planetary Radio Emissions VI*, pages 475–482. Austrian Acad. Sci. Press, Graz, Austria, 2006.
- [4] T. Oswald, et al. Various methods of calibration of the STEREO/Waves antennas. *Adv. Space. Res.*, 43, 355–364, 2009.

Oswald09/ASAP-OF

	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B
h	3,03	3,82	2,31	3,03	3,82	2,31
ζ	126,00	119,10	133,70	126,00	119,10	133,70
ξ	-141,40	129,10	21,40	-141,40	129,10	21,40
x/h	-0,588	-0,486	-0,691	-0,588	-0,486	-0,691
y/h	-0,505	0,678	0,264	-0,505	0,678	0,264
z/h	0,632	0,551	-0,673	0,632	0,551	-0,673
h	3,03	3,82	2,31	3,03	3,82	2,31
θ	50,78	56,56	132,31	50,78	56,56	132,31
φ	220,65	125,65	159,10	220,65	125,65	159,10
	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B

Oswald09/CONCEPT-OF

	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B
h	3,02	3,81	2,30	3,02	3,81	2,30
ζ	125,40	118,60	133,30	125,40	118,60	133,30
ξ	-141,30	129,00	21,40	-141,30	129,00	21,40
x/h	-0,579	-0,479	-0,686	-0,579	-0,479	-0,686
y/h	-0,510	0,682	0,266	-0,510	0,682	0,266
z/h	0,636	0,553	-0,678	0,636	0,553	-0,678
h	3,02	3,81	2,30	3,02	3,81	2,30
θ	50,49	56,46	132,66	50,49	56,46	132,66
φ	221,34	125,05	158,83	221,34	125,05	158,83
	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B

Oswald09/rheo-OF

	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B
h	2,89	3,84	2,36	2,89	3,84	2,36
ζ	126,20	118,70	132,20	126,20	118,70	132,20
ξ	-140,70	127,90	21,60	-140,70	127,90	21,60
x/h	-0,591	-0,480	-0,672	-0,591	-0,480	-0,672
y/h	-0,511	0,692	0,273	-0,511	0,692	0,273
z/h	0,624	0,539	-0,689	0,624	0,539	-0,689
h	2,89	3,84	2,36	2,89	3,84	2,36
θ	51,36	57,40	133,53	51,36	57,40	133,53
φ	220,87	124,75	157,90	220,87	124,75	157,90
	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B

Bale08/Graz-OF

	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B
h	2,98	3,85	2,34	2,98	3,85	2,34
ζ	126,00	118,80	133,00	126,00	118,80	133,00
ξ	-141,20	128,70	21,50	-141,20	128,70	21,50
x/h	-0,588	-0,482	-0,682	-0,588	-0,482	-0,682
y/h	-0,507	0,684	0,268	-0,507	0,684	0,268
z/h	0,630	0,548	-0,680	0,630	0,548	-0,680
h	2,98	3,85	2,34	2,98	3,85	2,34
θ	50,91	56,78	132,88	50,91	56,78	132,88
φ	220,78	125,16	158,54	220,78	125,16	158,54
	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B

Bale08/Berkeley-OF

	Ex-A	Ey-A	Ez-A	Ex-B	Ey-B	Ez-B
h	3,04	3,95	2,45	3,04	3,95	2,45
ζ	127,00	120,80	132,60	127,00	120,80	132,60
ξ	-148,00	123,60	22,60	-148,00	123,60	22,60
x/h	-0,602	-0,512	-0,677	-0,602	-0,512	-0,677
y/h	-0,423	0,715	0,283	-0,423	0,715	0,283
z/h	0,677	0,475	-0,680	0,677	0,475	-0,680
h	3,04	3,95	2,45	3,04	3,95	2,45
θ	47,37	61,62	132,81	47,37	61,62	

Summary of Calibrated Antenna Parameters (Ground measurement and modeling)

Ex-A

	<i>physical</i>	Oswald06/ ASAP-LF	Oswald09/ ASAP-LF	Oswald09/ ASAP-OF	Oswald09/ CONCEPT- LF	Oswald09/ CONCEPT- OF	Oswald09/ rheo-LF	Oswald09/ rheo-OF	Bale08/Graz- LF	Bale08/Graz- OF	Bale08/ Berkeley-OF	Macher07/ ASAP-LF	Macher07/ ASAP-OF	<i>Summary LF (mean)</i>	<i>Summary LF (sigma)</i>	<i>Summary OF (mean)</i>	<i>Summary OF (sigma)</i>
h	6,00	0,99	1,36	3,03	1,35	3,02	1,34	2,89	1,17	2,98	3,04	1,18	3,05	1,23	0,15	2,99	0,06
θ	65,90	52,28	51,71	50,78	51,96	50,49	52,53	51,36	52,33	50,91	47,37	52,07	50,53	52,15	0,29	50,82	0,35
φ	230,77	225,75	230,14	220,65	230,73	221,34	229,11	220,87	230,54	220,78	215,12	230,95	220,74	229,54	1,97	220,88	0,27

Ey-A

	<i>physical</i>	Oswald06/ ASAP-LF	Oswald09/ ASAP-LF	Oswald09/ ASAP-OF	Oswald09/ CONCEPT- LF	Oswald09/ CONCEPT- OF	Oswald09/ rheo-LF	Oswald09/ rheo-OF	Bale08/Graz- LF	Bale08/Graz- OF	Bale08/ Berkeley-OF	Macher07/ ASAP-LF	Macher07/ ASAP-OF	<i>Summary LF (mean)</i>	<i>Summary LF (sigma)</i>	<i>Summary OF (mean)</i>	<i>Summary OF (sigma)</i>
h	6,00	1,21	1,66	3,82	1,66	3,81	1,69	3,84	1,44	3,85	3,95	1,43	3,85	1,52	0,19	3,83	0,02
θ	65,90	58,62	56,58	56,56	56,51	56,46	57,15	57,40	56,71	56,78	61,62	56,39	56,37	56,99	0,84	56,71	0,41
φ	129,23	122,25	120,67	125,65	119,69	125,05	120,33	124,75	119,74	125,16	125,59	119,61	125,35	120,38	1,00	125,19	0,33

Ez-A

	<i>physical</i>	Oswald06/ ASAP-LF	Oswald09/ ASAP-LF	Oswald09/ ASAP-OF	Oswald09/ CONCEPT- LF	Oswald09/ CONCEPT- OF	Oswald09/ rheo-LF	Oswald09/ rheo-OF	Bale08/Graz- LF	Bale08/Graz- OF	Bale08/ Berkeley-OF	Macher07/ ASAP-LF	Macher07/ ASAP-OF	<i>Summary LF (mean)</i>	<i>Summary LF (sigma)</i>	<i>Summary OF (mean)</i>	<i>Summary OF (sigma)</i>
h	6,00	0,83	1,10	2,31	1,09	2,30	1,13	2,36	0,97	2,34	2,45	0,96	2,32	1,01	0,11	2,33	0,02
θ	144,74	139,29	141,35	132,31	142,40	132,66	141,53	133,53	142,58	132,88	132,81	142,77	132,32	141,65	1,29	132,74	0,50
φ	180,00	161,85	159,13	159,10	158,90	158,83	158,26	157,90	158,75	158,54	157,32	159,05	158,87	159,32	1,28	158,65	0,46

Ex-B

	<i>physical</i>	Oswald06/ ASAP-LF	Oswald09/ ASAP-LF	Oswald09/ ASAP-OF	Oswald09/ CONCEPT- LF	Oswald09/ CONCEPT- OF	Oswald09/ rheo-LF	Oswald09/ rheo-OF	Bale08/Graz- LF	Bale08/Graz- OF	Bale08/ Berkeley-OF	Macher07/ ASAP-LF	Macher07/ ASAP-OF	<i>Summary LF (mean)</i>	<i>Summary LF (sigma)</i>	<i>Summary OF (mean)</i>	<i>Summary OF (sigma)</i>
h	6,00	0,98	1,36	3,03	1,35	3,02	1,34	2,89	1,17	2,98	3,04	1,18	3,05	1,23	0,15	2,99	0,06
θ	65,90	53,48	51,71	50,78	51,96	50,49	52,53	51,36	52,33	50,91	47,37	52,07	50,53	52,35	0,62	50,82	0,35
φ	230,77	226,91	230,14	220,65	230,73	221,34	229,11	220,87	230,54	220,78	215,12	230,95	220,74	229,73	1,53	220,88	0,27

Ey-B

	<i>physical</i>	Oswald06/ ASAP-LF	Oswald09/ ASAP-LF	Oswald09/ ASAP-OF	Oswald09/ CONCEPT- LF	Oswald09/ CONCEPT- OF	Oswald09/ rheo-LF	Oswald09/ rheo-OF	Bale08/Graz- LF	Bale08/Graz- OF	Bale08/ Berkeley-OF	Macher07/ ASAP-LF	Macher07/ ASAP-OF	<i>Summary LF (mean)</i>	<i>Summary LF (sigma)</i>	<i>Summary OF (mean)</i>	<i>Summary OF (sigma)</i>
h	6,00	1,18	1,66	3,82	1,66	3,81	1,69	3,84	1,44	3,85	3,95	1,43	3,85	1,51	0,20	3,83	0,02
θ	65,90	59,22	56,58	56,56	56,51	56,46	57,15	57,40	56,71	56,78	61,62	56,39	56,37	57,09	1,07	56,71	0,41
φ	129,23	122,39	120,67	125,65	119,69	125,05	120,33	124,75	119,74	125,16	125,59	119,61	125,35	120,41	1,06	125,19	0,33

Ez-B

	<i>physical</i>	Oswald06/ ASAP-LF	Oswald09/ ASAP-LF	Oswald09/ ASAP-OF	Oswald09/ CONCEPT- LF	Oswald09/ CONCEPT- OF	Oswald09/ rheo-LF	Oswald09/ rheo-OF	Bale08/Graz- LF	Bale08/Graz- OF	Bale08/ Berkeley-OF	Macher07/ ASAP-LF	Macher07/ ASAP-OF	<i>Summary LF (mean)</i>	<i>Summary LF (sigma)</i>	<i>Summary OF (mean)</i>	<i>Summary OF (sigma)</i>
h	6,00	0,84	1,10	2,31	1,09	2,30	1,13	2,36	0,97	2,34	2,45	0,96	2,32	1,02	0,11	2,33	0,02
θ	144,74	140,82	141,35	132,31	142,40	132,66	141,53	133,53	142,58	132,88	132,81	142,77	132,32	141,91	0,78	132,74	0,50
φ	180,00	163,14	159,13	159,10	158,90	158,83	158,26	157,90	158,75	158,54	157,32	159,05	158,87	159,54	1,79	158,65	0,46

Inflight Calibration using AKR on STEREO-B (courtesy M. Panchenko)

Panchenko/AKR/DF2 (3-antenna mode)

	Ex-B		Ey-B		Ez-B	
h/hx	1,00	± 0,00	1,27	± 0,01	0,78	± 0,01
ζ	119,00	± 0,50	115,10	± 0,30	123,70	± 0,50
ξ	-135,10	± 0,80	124,80	± 0,70	13,40	± 0,80
x/h	-0,485	± 0,01	-0,424	± 0,00	-0,555	± 0,01
y/h	-0,617	± 0,01	0,744	± 0,01	0,193	± 0,01
z/h	0,620	± 0,01	0,517	± 0,01	-0,809	± 0,01
h/hx	1,00	± 0,00	1,27	± 0,01	0,78	± 0,01
θ	51,72	± 0,85	58,88	± 0,52	144,03	± 0,72
φ	231,86	± 0,03	119,70	± 1,27	160,84	± 1,05
	Ex-B		Ey-B		Ez-B	

Panchenko/AKR/DF1 (2-antenna mode='13')

	Ex-B		Ezy-B	
h/hx	1,00	± 0,00	1,33	± 0,01
ζ	120,40	± 0,10	91,80	± 0,10
ξ	-135,00	± 0,10	147,10	± 0,10
x/h	-0,506	± 0,00	-0,031	± 0,00
y/h	-0,610	± 0,00	0,543	± 0,00
z/h	0,610	± 0,00	0,839	± 0,00
h/hx	1,00	± 0,00	1,33	± 0,01
θ	52,42	± 0,12	32,94	± 0,09
φ	230,32	± 0,07	93,31	± 2,91
	Ex-B		Ezy-B	

Panchenko/AKR/DF1 (2-antenna mode='31')

	Exy-B		Ez-B	
h/hz	1,76	± 0,01	1,00	± 0,00
ζ	91,10	± 0,20	125,00	± 0,30
ξ	89,70	± 0,20	13,80	± 0,30
x/h	-0,019	± 0,00	-0,574	± 0,00
y/h	1,000	± 0,00	0,195	± 0,00
z/h	-0,005	± 0,00	-0,796	± 0,00
h/hz	1,76	± 0,01	1,00	± 0,00
θ	90,30	± 0,20	142,70	± 0,37
φ	91,10	± 0,35	161,19	± 0,52
	Exy-B		Ez-B	

Summary of Calibrated Antenna Parameters (all available calibrations)

Ex

	ground	inflight DF2	inflight DF1	Mean
θ	52,15	51,72	52,42	52,37
	$\pm 0,29$	$\pm 0,85$	$\pm 0,12$	$\pm 0,16$
ϕ	229,54	231,86	230,32	231,61
	$\pm 1,97$	$\pm 0,03$	$\pm 0,07$	$\pm 0,04$

Exy

	ground	inflight DF2	Inflight DF1	Mean
θ	—	—	90,30	90,30
	—	—	$\pm 0,20$	$\pm 0,20$
ϕ	—	—	91,10	91,10
	—	—	$\pm 0,35$	$\pm 0,35$

Ey

	ground	inflight DF2	Inflight DF1	Mean
θ	56,99	58,88	—	58,35
	$\pm 0,84$	$\pm 0,52$	—	$\pm 0,61$
ϕ	120,38	119,70	—	120,12
	$\pm 1,00$	$\pm 1,27$	—	$\pm 1,11$

Eyz

	ground	inflight DF2	Inflight DF1	Mean
θ	—	—	32,94	32,94
	—	—	$\pm 0,09$	$\pm 0,09$
ϕ	—	—	93,31	93,31
	—	—	$\pm 2,91$	$\pm 2,91$

Ez

	ground	inflight DF2	Inflight DF1	Mean
θ	141,65	144,03	142,70	142,90
	$\pm 1,29$	$\pm 0,72$	$\pm 0,37$	$\pm 0,50$
ϕ	159,32	160,84	161,19	160,91
	$\pm 1,28$	$\pm 1,05$	$\pm 0,52$	$\pm 0,70$