OPTICAL DETERMINATION IN THE POSITIONS OF RADIO STARS

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ABSTRACT. Optical positions of 16 radio stars have been derived from 40 cm astrograph at Zô-Sè. The reference catalogues are AGK3 and SAO, the average mean square error of single observation is 0".058 in the right ascension and 0".053 in declination. The magnitude difference has no significant effect on the observations.

1. INTRODUCTION

Since 1980 the positions and the proper motions of some brighter radio stars have been determined with the astrolabe at Shanghai Observatory (Lu, 1982, Lu et al., 1985). In 1985 the radio stars with declinations from +65° to -23° are selected from the list of radio stars which were recommended by the Working Group of IAU for radio /optical indentification, amounting to a total of 89 objects. The magnitude range is from 8.5 to 13.0. These objects are being observed with the astrograph. The present work represents the results of 16 radio stars in our list.

2. OBSERVING AND REDUCTION

The optical positions of all 16 radio stars have been obtained from the plates taken with 40 cm, f = 7 metre astrograph of Zô-Sè Section, Shanghai Observatory. The using field of the plate is about 1°x 1°. The emulsions are 103a-O. All plates have been measured on the PDS of the Purple Mountain Observatory, which provides a measuring accuracy of 1.5 μ corresponding to an angular accuracy of ±0".045. The positions of radio stars have been given from a least-square adjustment of the plates to the AGK3 catalogue for the northern hemisphere and the SAO catalogue for the southern hemisphere using 6-constants. About 15 reference stars are used for reducing each object.
In the reduction the corrections of the diurnal aberration and the atmospheric refraction are consistent.

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3. RESULTS

In Table 1 the final results(SO) are given. The first column gives the name of radio star, the second column magnitude, the third and forth columns average observing epoch and Julian day, the fifth and seventh columns right ascension and declination for the J2000 standard epoch, the sixth and eighth columns mean square error in right ascension and declination respectively, the ninth column number of observation.

According to the all observations of 16 radio stars, the average mean square error of single observation are

$$\sigma_\alpha \cos\delta = \pm 0''.058 \qquad \sigma_\delta = \pm 0''.053 \qquad (1)$$

However if the observations relating to the AGK3 catalogue are considered, the average mean square error of single observation in right ascension and declination are

$$\sigma_\alpha \cos\delta = \pm 0''.052 \qquad \sigma_\delta = \pm 0''.039 \qquad (2)$$

respectively.

4. MAGNITUDE AND COMPARISON

According to the analysis of the relation between the magnitudes and the observational residuals, the magnitude difference has no significant effect on the observation.

Comparisons with the radio observations by Florkowski et al.(1985), Lestrade et al.(1985), and the optical observations by de Vegt et al.(1985), hereafter referred to as FR,LR and VO respectively, give the differences shown in Table 2. At the bottom of column 2 and 3 the comparisons between the optical results by de Vegt et al. and the radio results by Florkowski et al. are listed. For comparison the positions of FR,VO have been referred to the J2000 standard epoch system.

From Table 2 the difference in the right ascension between SO and VO is larger. The observations of VO have been referred to the AGK3RN catalogue. In a recent paper by Schwan(1985), for the AGK3 proper motions the average mean error is about 0''.93/100yr and for the positions the average mean error is about 0''.18, and according to our observing accuracy of single observation equation (2) in Section 3, the total error of the difference is about 0''.40. So the comparison of our positions with these from FR, LR and VO shows, that these results have no significant non-coincidence with each other.

TABLE 1

Name (1)	Mg (2)	Observing epoch (3)	JD (4)	2000 (5)	cos (6)	2000 (7)	(8)	N (9)
UV PSC	9.1	1985.90	2446396.231	$1^h16^m55^s.033$	+0".011	6°48'41".89	+0".014	10
T TAU	9.6-13.5	1986.03	443.034	4 21 59 .421	10	19 32 06 .17	12	12
RU AUR	13.0	1985.95	426.307	5 40 07 .880	16	37 38 10 .29	8	16
ROSS 882	11.8	1986.02	437.193	7 44 40 .487	10	3 33 15 .09	10	15
RU CNC	11.6	1986.02	438.822	8 37 30 .144	10	23 33 41 .63	8	15
DM+16 2708	10.2	1985.47	236.458	14 54 28 .945	15	16 06 05 .63	13	17
DM-08 4352	9.8	1985.47	236.114	16 55 29 .535	14	- 8 19 58 .20	11	9
VX SGR	11.8	1985.55	266.707	18 08 05 .234	33	-22 13 19 .98	38	8
RY SCT	9.7	1985.58	278.393	18 25 31 .517	21	-12 41 23 .79	12	9
V1216 SGR	10.6	1985.57	272.102	18 50 50 .165	39	-23 46 50 .35	30	6
V1016 CYG	10.4	1985.67	310.047	19 57 05 .036	14	39 49 36 .02	12	12
CYG X-1	8.9	1985.58	275.464	19 58 21 .685	19	35 12 05 .99	46	9
CYG OB2-5	9.0	1985.63	298.439	20 32 22 .425	19	41 18 18 .90	12	12
CYG OB2-9	10.2	1985.63	298.439	20 33 30 .795	25	41 15 22 .62	14	12
CYG OB2-8	9.0	1985.63	298.439	20 33 39 .108	19	41 19 25 .92	13	12
RT LAC	8.8	1985.64	299.262	22 01 30 .689	15	43 53 25 .24	12	10

TABLE 2

(1)	(2)		(3)	
	CYG X-1			
	α_{2000}	δ_{2000}		
SO	$19^h58^m21^s.685$	35°12'05".99		
LR	21 .6804	05 .887		
Difference	+ 0 .0046	+ 0 .103		
	CYG OB2-5		RT LAC	
	α_{2000}	δ_{2000}	α_{2000}	δ_{2000}
SO	$20^h32^m22^s.425$	41°18'18".90	$22^h01^m30^s.689$	43°53'25".24
FR	22 .429	18 .99	30 .649	25 .26
Difference	- 0 .004	- 0 .09	+ 0 .040	- 0 .02
SO	22 .425	18 .90	30 .689	25 .24
VO	22 .425	19 .04	30 .657	25 .44
Difference	0	- 0 .14	+ 0 .032	- 0 .20
VO	22 .425	19 .04	30 .657	25 .44
FR	22 .429	18 .99	30 .649	25 .26
DIfference	- 0 .004	+ 0 .05	+ 0 .008	+ 0 .18

REFERENCES

Lu, P.-z., 1982, Annals of Shanghai Observatory, Academia Sinica, **4**, 149.
Lu, P.-z., et al., 1985, Annals of Shanghai Observatory, Academia Sinica, **7**, 180.
Florwski, D. R.. et al., 1985, Astron. J., **90**, 2381.
Lestrade, J. F., et al., 1985, The Second F.A.S.T. Thinkshop, Marseille, Kovalevsky, J. (ed.), 87.
de Vegt, G., et al., 1985, Astron. J., **90**, 2387.
Schwan, H., 1985, Astron. Astrophys., **149**, 50.

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