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SPECKLE INTERFEROMETRY AT THE OBSERVATORIO ASTRONÓMICO NACIONAL. V

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RESUMEN

Presentamos mediciones de estrellas binarias mediante interferometría de motas (*speckle*), realizadas en septiembre, octubre y noviembre de 2009 con el telescopio de 1.5-m del Observatorio Astronómico Nacional en SPM (México). Reportamos los resultados de 645 medidas de 504 pares de estrellas, con una magnitud límite para la primaria de $V = 12.3$. Las separaciones angulares van desde $0''.144$ hasta $5''.17$. 396 pares tienen separaciones de menos de $1''$. El error medio en las separaciones es de $0''.033$, y el de los ángulos de posición, $0°.9$. La ambigüedad de 180°, usual en este tipo de mediciones, fue corregida para la mayoría de los pares usando observaciones de otros autores.

ABSTRACT

We present speckle interferometric measurements of binary stars performed during September, October and November of 2009 with the 1.5-m telescope of the Observatorio Astronómico Nacional at SPM (Mexico). We report here the results of 645 measurements of 504 pairs of stars with a primary limiting magnitude of $V = 12.3$. The measured angular separations range from $0''.144$ to $5''.17$. 396 pairs have separations of less than $1''$. The mean error in separation is $0''.033$ and in position angle, $0°.9$. The usual 180° ambiguity was corrected for the majority of position angles by comparison with observations performed by other observers.

Key Words: binaries: visual — stars: fundamental parameters — techniques: high angular resolution — techniques: interferometric

1. INTRODUCTION

This is the fifth paper in the series of publications presenting the results of speckle interferometric observations of binary stars performed with telescopes of the Observatorio Astronómico Nacional (OAN) of the Instituto de Astronomía, Universidad Nacional Autónoma de México. Regular speckle interferometric measurements of binary stars have been made with telescopes of the OAN since 2008 (Orlov et al. 2009). This paper presents the results of double star observations carried out with the 1.5-m Telescopes of Sierra San Pedro Mártir (SPM), OAN, in September, October and November of 2009. During the observations we used only one broadband filter R (630/120 nm).

2. OBSERVATIONS AND RESULTS

The observations were performed at the 1.5-m telescope of the OAN which is located at the OAN-SPM (Mexico).

For these observations we used the DRAGON equipment (Voitsekhovich et al. 2005), which was slightly modified to be able to record speckle interfer-

TABLE 1

DISTRIBUTION OF PAIRS BY THEIR SEPARATIONS

$>1''.5$	$1''.5 - 1''$	$1'' - 0''.5$	$0''.5 - 0''.25$	$<0.''25$
140	72	145	135	14

TABLE 2

SPECKLE MEASUREMENTS ON THE 1.5-M TELESCOPE

WDS (2000)	Discoverer designation	Epoch +2000	θ (deg)	σ_θ (deg)	ρ (arcsec)	σ_ρ (arcsec)	$\theta_O - \theta_C$ (deg)	$\rho_O - \rho_C$ (arcsec)	Ref.
00002 + 3613	TDS1236	9.7368	331.4	0.2	0.50	0.00			
00004 + 2749	TDS1238	9.7342	87.5	0.1	0.86	0.00			
00013 + 3351	TDS1248	9.7423	51.2	3.1	0.71	0.05			
00015 + 3044	HO208	9.7289	190.8	4.4	1.05	0.17			
00015 + 3044	HO208	9.8460	189.6	7.6	1.03	0.41			
00023 + 3257	HO209AB	9.7342	347.0	0.3	1.40	0.01			
00035 + 3434	OL77	9.7289	255.4	0.3	2.80	0.01			
00037 + 3752	COU846	9.7423	150.7	1.0	0.93	0.05			
00047 + 3416	STF3056AB	9.7342	142.2	0.6	0.71	0.01			
00053 + 3533	COU746	9.7343	105.2	0.6	0.61	0.01			
00053 + 3533	COU746	9.7396	105.4	0.7	0.60	0.01			
00054 + 3348	COU646	9.7260	330.5	1.1	0.47	0.02			
00090 + 2339	HU402	9.7396	67.0	1.0	0.56	0.01			
00098 + 3731	COU847AB	9.8460	1.4	0.8	1.68	0.06			
00115 + 2936	HO1	9.7289	158.2	0.2	1.24	0.01			
00115 + 3556	HDS24	9.7423	355.2	4.9	0.49	0.08			
00121 + 3328	COU649AB	9.7396	352.1	0.9	0.54	0.04			
00162 + 3331	COU651	9.8542	107.9	1.6	0.30	0.03			
00165 + 2918	BU487BC	9.7289	264.1	0.2	2.40	0.03			
00172 + 3317	J869	9.7315	246.9	0.0	1.67	0.00			
00172 + 3317	J869	9.7315	246.9	0.0	1.67	0.00			
00179 + 3435	HDS41	9.7396	283.7	8.5	0.52	0.03			
00209 + 3259	AC1	9.7260	288.3	0.2	1.80	0.01			
00211 + 3539	HU1202	9.7315	195.5	0.2	1.10	0.02			
00241 + 2652	TDS1441	9.7315	136.7	0.5	0.47	0.02			
00241 + 2652	TDS1441	9.7369	135.9	0.3	0.49	0.01			
00261 + 2359	HU407	9.7807	330.1	6.5	1.20	0.46			
00262 + 2827	COU446	9.7260	314.9	0.9	0.87	0.05			
00262 + 2827	COU446	9.7289	311.9	0.7	0.85	0.06			
00269 + 2356	TDS1466	9.7451	20.4	3.1	0.29	0.06			
00270 + 3058	COU653	9.8542	257.6	3.5	0.45	0.02			
00298 + 3650	COU1049	9.7369	37.4	0.4	0.73	0.03			
00310 + 3406	STF33	9.7289	213.1	0.1	2.77	0.00			
00310 + 3406	STF33	9.7315	212.8	0.2	2.76	0.00			
00312 + 3325	HU1009	9.7261	239.7	0.1	1.90	0.01			
00329 + 3551	HO211	9.7807	17.3	15.0	1.65	0.08			
00345 + 3015	COU654	9.7289	31.8	1.1	0.28	0.04			
00352 + 3351	HU1010	9.7261	91.9	0.4	1.11	0.01			
00353 + 2456	TDS1533	9.7369	23.9	0.6	0.64	0.01			
00360 + 3708	COU850	9.7807	309.8	0.9	0.38	0.02			
00360 + 3708	COU850	9.8543	306.9	1.9	0.36	0.04			
00378 + 2913	ES315	9.7343	86.3	0.1	2.26	0.01			
00393 + 3359	COU656	9.7261	153.2	0.3	0.78	0.03			
00393 + 3359	COU656	9.7289	151.9	0.7	0.79	0.05			
00393 + 3359	COU656	9.7424	151.6	0.7	0.82	0.04			
00394 + 3446	COU657	9.7316	38.0	0.1	1.20	0.00			
00404 + 2504	COU75	9.7369	59.8	0.8	0.46	0.01			
00453 + 3448	COU1204	9.7261	66.1	0.3	0.81	0.01			
00453 + 3448	COU1204	9.7289	67.5	1.2	0.74	0.04			
00453 + 3448	COU1204	9.7316	69.6	0.5	0.78	0.01			
00453 + 3448	COU1204	9.7369	67.2	0.9	0.76	0.03			
00453 + 3448	COU1204	9.7396	70.2	0.7	0.73	0.01			
00453 + 3448	COU1204	9.7397	68.0	1.4	0.73	0.01			
00453 + 3448	COU1204	9.7424	68.3	0.8	0.80	0.03			
00454 + 3434	ES2140	9.7343	232.8	0.1	2.16	0.01			
00464 + 3243	COU748	9.7780	182.2	0.1	1.14	0.01			
00464 + 3243	COU748	9.8460	180.9	1.1	1.11	0.04			
00487 + 3202	TDS1626	9.7451	159.0	0.5	1.17	0.03			
00493 + 3508	COU1208	9.7316	252.2	0.2	1.11	0.01			
00507 + 3357	HO4	9.7343	17.5	0.1	1.99	0.01			
00507 + 3649	COU1052	9.7781	121.5	0.0	0.94	0.00			
00508 + 3203	A922Aa, Ab	9.7261	334.3	0.9	0.55	0.01	−5.3	0.06	(Mason & Hartkopf 2001)
00511 + 2853	COU447	9.7369	38.4	0.3	0.87	0.03			
00511 + 2853	COU447	9.7397	218.5	0.8	0.86	0.03			
00513 + 3543	COU1209	9.7289	333.9	0.8	2.39	0.05			
00513 + 3543	COU1209	9.7807	333.9	0.6	2.41	0.12			
00517 + 3822	COU1053	9.7424	247.2	0.1	3.04	0.02			
00520 + 3154	A924	9.7316	315.6	2.0	0.28	0.03	0.2	0.02	(Hartkopf & Mason 2009)
00521 + 2520	TDS1644	9.8460	0.3	0.0	2.29	0.00			
00527 + 3316	ES316	9.7261	295.6	0.0	2.91	0.00			
00527 + 3316	ES316	9.7343	295.3	0.0	2.89	0.00			
00551 + 2811	A437AB	9.7290	29.4	0.1	2.99	0.01			

TABLE 2 (CONTINUED)

WDS (2000)	Discoverer designation	Epoch +2000	θ (deg)	σ_θ (deg)	ρ (arcsec)	σ_ρ (arcsec)	$\theta_O - \theta_C$ (deg)	$\rho_O - \rho_C$ (arcsec)	Ref.
00559 + 2817	TDS33	9.7316	236.4	0.0	1.80	0.01			
00561 + 3352	HU1207	9.7261	181.9	2.7	0.32	0.03			
00561 + 3352	HU1207	9.7290	187.5	2.6	0.32	0.02			
00561 + 3352	HU1207	9.7343	186.2	1.4	0.31	0.02			
00567 + 3417	COU659	9.7451	213.9	0.1	1.04	0.01			
01005 + 3718	ES2008	9.7807	43.8	0.0	2.15	0.11			
01014 + 3535	COU854	9.7290	38.1	8.2	0.14	0.20	8.0	0.00	(Hartkopf & Mason 2009)
01041 + 2635	COU351	9.7261	243.2	0.9	0.78	0.05			
01041 + 2635	COU351	9.7290	243.1	3.1	0.82	0.23			
01041 + 2635	COU351	9.7370	241.9	16.9	0.75	0.25			
01041 + 2635	COU351	9.7397	249.3	19.2	0.80	0.03			
01053 + 3117	COU549	9.8461	255.1	0.2	1.30	0.02			
01063 + 3306	TDS1767	9.7316	179.8	0.3	0.95	0.01			
01065 + 2834	VKI2	9.7344	187.7	0.0	2.08	0.00			
01070 + 3014	A929AB	9.7397	126.5	0.8	0.67	0.02			
01070 + 3014	A929AB	9.7424	127.0	0.6	0.67	0.03			
01077 + 3440	COU661	9.7424	319.2	0.2	3.00	0.03			
01088 + 3024	HDS149	9.7261	176.9	10.7	0.38	0.06			
01088 + 3024	HDS149	9.7316	186.3	8.8	0.35	0.09			
01093 + 2428	COU78	9.7397	358.5	1.1	0.90	0.04			
01104 + 2952	BU2	9.7290	152.6	0.2	2.10	0.07			
01104 + 2952	BU2	9.7344	152.6	1.5	2.10	0.14			
01106 + 3557	BU1162	9.7808	131.7	4.2	0.30	0.02			
01106 + 3557	BU1162	9.8543	132.8	3.5	0.29	0.04			
01125 + 3747	COU1057	9.7397	174.5	1.5	0.43	0.02			
01125 + 3747	COU1057	9.7751	175.8	5.4	0.44	0.04			
01127 + 3536	DOO27	9.7808	203.0	0.3	1.44	0.07			
01127 + 3536	DOO27	9.8461	203.0	0.1	1.43	0.02			
01131 + 2942	A1260AB	9.7261	59.5	3.2	0.26	0.06	−2.1	0.13	(Olevic et al. 2003)
01146 + 2804	A1904	9.7316	73.0	0.1	1.21	0.01			
01151 + 3416	HU803	9.7290	215.0	8.2	0.90	0.12			
01180 + 3750	COU856	9.7452	21.3	0.7	1.19	0.07			
01191 + 3139	TDS47	9.7316	182.6	0.1	1.28	0.01			
01214 + 3440	POP54AB	9.7290	46.4	0.1	1.30	0.01			
01214 + 3440	POP54AB	9.7344	46.2	0.1	1.29	0.01			
01217 + 3238	COU665	9.7290	172.6	1.0	1.07	0.04			
01217 + 3238	COU665	9.7397	172.9	1.5	1.06	0.02			
01254 + 3353	ES2211	9.7316	224.8	0.0	2.90	0.00			
01255 + 2832	HO310	9.7344	355.9	0.1	1.68	0.00			
01258 + 2733	COU666	9.8461	145.3	2.9	0.40	0.04			
01258 + 2733	COU666	9.8543	147.0	2.7	0.43	0.02			
01286 + 3334	ES319	9.7262	291.5	0.1	2.21	0.01			
01286 + 3334	ES319	9.7344	291.8	0.1	2.21	0.00			
01345 + 3440	A1913AB	9.7344	311.9	0.5	0.40	0.02	32.4	0.14	(Baize 1987)
01349 + 2532	TDS1920	9.7452	246.7	2.2	0.41	0.05			
01349 + 2532	TDS1920	9.7751	244.5	0.8	0.45	0.05			
01359 + 3304	HLD6	9.7290	293.9	0.0	2.13	0.00			
01379 + 2753	MLB516	9.7262	240.0	0.2	1.79	0.01			
01379 + 2753	MLB516	9.7344	239.2	0.1	1.76	0.02			
01385 + 3448	COU1059	9.7290	127.6	1.2	0.31	0.02			
01385 + 3448	COU1059	9.7370	127.3	0.8	0.31	0.03			
01385 + 3448	COU1059	9.7398	131.0	1.4	0.37	0.02			
01388 + 3453	COU1060	9.8461	185.8	0.5	0.51	0.02			
01391 + 2656	BU508AB	9.7290	52.9	0.7	0.60	0.04			
01391 + 2656	BU508AB	9.8543	51.7	2.5	0.60	0.05			
01394 + 3729	COU1216	9.7808	32.2	0.4	1.48	0.07			
01394 + 3729	COU1216	9.8461	32.2	0.4	1.48	0.04			
01395 + 3310	COU749	9.7317	17.4	0.0	2.31	0.00			
01421 + 3559	TDS59	9.8461	159.7	0.0	1.05	0.00			
01428 + 3749	COU1062	9.7808	94.1	4.1	0.31	0.02			
01431 + 3426	COU668Aa, Ab	9.7345	253.0	0.4	0.69	0.00			
01431 + 3426	COU668Aa, Ab	9.7398	252.9	0.6	0.70	0.03			
01431 + 3426	COU668Aa, Ab	9.7452	253.0	0.4	0.70	0.02			
01450 + 2703	COU750	9.8543	26.9	1.2	0.28	0.05	−2.1	−0.06	(Docobo & Ling 2005)
01455 + 3452	HU1031	9.7262	336.1	1.1	1.08	0.05			
01455 + 3452	HU1031	9.7291	336.2	1.7	1.08	0.07			
01455 + 3452	HU1031	9.7345	336.8	0.7	1.08	0.02			
01462 + 3343	HU804	9.7291	68.8	2.8	0.28	0.02	−1.9	−0.13	(Olevic & Jovanovic 2001)
01465 + 2936	COU451	9.8516	74.8	1.6	0.30	0.02			
01475 + 3423	ES2213	9.7262	208.5	0.0	2.56	0.00			
01487 + 3746	COU1065	9.7836	155.0	1.9	0.48	0.02			
01487 + 3746	COU1065	9.8516	155.3	0.5	0.48	0.02			
01491 + 3441	COU751	9.7808	151.1	0.1	1.87	0.09			
01492 + 2815	A2009	9.8517	321.9	0.2	0.86	0.01			

TABLE 2 (CONTINUED)

WDS (2000)	Discoverer designation	Epoch +2000	θ (deg)	σ_θ (deg)	ρ (arcsec)	σ_ρ (arcsec)	$\theta_O - \theta_C$ (deg)	$\rho_O - \rho_C$ (arcsec)	Ref.
01502 + 2702	BU1313	9.7291	152.9	2.9	0.55	0.02			
01502 + 2702	BU1313	9.7345	154.1	0.7	0.55	0.02			
01508 + 3455	ES2143	9.7291	202.8	0.1	3.00	0.02			
01508 + 3455	ES2143	9.8544	202.0	0.2	3.03	0.01			
01517 + 2657	TDS2028	9.7452	173.0	1.0	0.64	0.02			
01517 + 2657	TDS2028	9.7752	172.6	0.6	0.66	0.02			
01542 + 3607	COU858	9.7809	275.9	0.6	1.05	0.05			
01563 + 2520	COU453	9.7370	280.9	0.8	0.70	0.02			
01579 + 3310	A1920	9.7291	234.8	0.3	1.75	0.02			
01581 + 3041	TDS2070	9.8462	244.2	0.5	0.67	0.03			
01581 + 3041	TDS2070	9.8544	244.4	0.6	0.67	0.01			
01581 + 3444	COU859	9.7291	184.2	3.8	0.26	0.04			
01581 + 3444	COU859	9.7398	181.3	3.4	0.25	0.02			
01586 + 3334	HDS267	9.7262	166.9	20.0	0.25	0.06			
01588 + 3730	COU1364	9.8517	52.7	0.6	0.49	0.00			
01589 + 3741	HO10	9.7781	202.3	0.4	2.78	0.04			
01596 + 3044	COU669	9.7371	289.9	0.1	1.00	0.00			
02003 + 2436	COU753	9.7836	97.6	0.1	1.79	0.00			
02021 + 3347	A1924	9.8517	160.1	0.4	0.52	0.01			
02048 + 3110	COU454	9.7453	257.9	0.2	0.98	0.01			
02055 + 3018	COU455	9.7263	104.5	3.8	0.35	0.03			
02055 + 3308	ES322	9.7317	85.0	0.0	2.81	0.00			
02065 + 2650	COU353	9.7291	90.9	4.1	0.54	0.04			
02065 + 2650	COU353	9.7398	86.7	2.8	0.56	0.01			
02077 + 3418	A2012	9.7371	336.7	1.2	0.57	0.03			
02080 + 2618	TDS2132	9.7291	26.8	0.5	1.57	0.05			
02090 + 3540	COU1067	9.7263	34.2	5.4	0.22	0.06			
02099 + 3449	HU1034	9.7752	107.1	27.9	0.33	0.10			
02120 + 3349	COU862	9.7263	277.5	1.5	0.69	0.04			
02128 + 3722	HO497	9.8544	91.1	5.7	0.47	0.04			
02130 + 3129	TDS2161	9.7317	49.9	0.1	0.87	0.01			
02130 + 3129	TDS2161	9.7371	49.1	0.1	0.84	0.01			
02144 + 3454	HU807	9.8544	145.4	1.8	0.51	0.02			
02161 + 3109	COU670	9.7263	134.3	0.9	0.77	0.06			
02161 + 3109	COU670	9.7426	132.5	1.6	0.81	0.03			
02161 + 3501	HU1036	9.7317	158.9	0.7	0.51	0.01			
02184 + 2757	COU354	9.7371	143.7	5.1	0.70	0.08			
02196 + 3315	HU808	9.7809	212.5	1.8	0.48	0.02			
02196 + 3315	HU808	9.8517	213.8	0.5	0.49	0.04			
02201 + 3043	TDS2209	9.7317	157.1	0.0	2.19	0.00			
02212 + 2751	COU457	9.7836	159.6	0.8	0.52	0.02			
02212 + 2751	COU457	9.8462	163.1	0.8	0.49	0.01			
02212 + 2751	COU457	9.8544	161.4	0.9	0.52	0.01			
02217 + 2631	A2014	9.7263	29.7	0.8	1.19	0.06			
02217 + 3441	PTT4BC	9.7317	148.0	0.1	1.81	0.01			
02222 + 3340	COU754	9.7809	79.2	0.6	0.70	0.03			
02222 + 3340	COU754	9.8517	79.2	0.2	0.70	0.01			
02229 + 3445	COU1069	9.7426	297.4	1.3	0.41	0.04			
02249 + 3039	HDS314Aa, Ab	9.7371	279.7	21.7	0.35	0.05	9.9	−0.03	(Ling 2012b)
02255 + 2745	COU458	9.7318	300.8	0.1	1.23	0.01			
02267 + 3207	A964Aa, Ab	9.7318	80.7	5.7	0.24	0.01			
02282 + 2320	HU428	9.8544	39.4	1.6	0.28	0.06			
02292 + 2904	A965	9.7318	213.0	1.1	1.88	0.07			
02333 + 3646	COU1219	9.7782	70.0	0.2	1.12	0.03			
02333 + 3646	COU1219	9.8517	69.1	0.1	1.12	0.01			
02361 + 2924	HDS338	9.7263	308.0	23.9	0.48	0.39			
02363 + 2834	A2022	9.7318	323.7	4.4	1.00	0.17			
02388 + 3325	STF285	9.7263	163.5	1.5	1.66	0.04			
02391 + 2854	ES324BC	9.7318	17.8	0.1	2.65	0.01			
02399 + 3403	YR22	9.7399	290.1	4.7	0.51	0.03			
02407 + 2637	STT43	9.7318	345.5	0.3	0.69	0.01	1.6	0.03	(Scardia et al. 2001)
02431 + 2700	HDS355	9.7371	279.4	79.2	0.42	0.18			
02434 + 3148	A825	9.7292	128.3	0.9	1.88	0.06			
02472 + 3634	COU1072	9.7399	30.9	35.5	0.67	0.00			
02478 + 3103	BU262	9.7263	51.4	1.4	1.72	0.07			
02490 + 3605	COU864	9.8463	63.6	0.3	0.95	0.02			
02492 + 3358	BU523AB	9.7318	205.6	0.1	2.00	0.01			
02500 + 3340	COU673	9.7292	13.2	1.1	0.65	0.05			
02500 + 3340	COU673	9.7371	12.3	1.3	0.65	0.04			
02500 + 3340	COU673	9.7426	12.3	1.9	0.64	0.03			
02501 + 3217	COU674	9.7318	281.7	0.2	1.96	0.02			
02503 + 3230	COU675	9.7782	55.3	0.5	0.55	0.04			
02503 + 3230	COU675	9.7809	55.7	0.5	0.56	0.03			
02503 + 3230	COU675	9.8463	58.3	0.5	0.59	0.02			

TABLE 2 (CONTINUED)

WDS (2000)	Discoverer designation	Epoch +2000	θ (deg)	σ_θ (deg)	ρ (arcsec)	σ_ρ (arcsec)	$\theta_O - \theta_C$ (deg)	$\rho_O - \rho_C$ (arcsec)	Ref.
02503 + 3230	COU675	9.8545	55.2	0.6	0.56	0.02			
02505 + 2918	MLB637	9.7810	264.1	0.1	1.85	0.09			
02505 + 2918	MLB637	9.8518	263.8	0.1	1.85	0.01			
02524 + 2918	COU554	9.7292	196.7	1.4	0.32	0.03			
02524 + 2918	COU554	9.7318	195.9	1.4	0.33	0.03			
02538 + 3544	COU866	9.7372	197.9	2.2	0.90	0.06			
02542 + 2658	A1929	9.7264	302.3	0.3	2.99	0.06			
02542 + 2658	A1929	9.7292	302.2	0.2	3.01	0.03			
02557 + 3028	COU555AB	9.7810	280.4	4.5	1.72	0.08			
02558 + 3532	HU810	9.7810	18.2	4.7	1.46	0.07			
02581 + 3103	COU556	9.7426	318.2	3.9	0.32	0.04			
02587 + 3338	TDS2400	9.7372	153.2	0.3	0.78	0.00			
03017 + 3455	COU868	9.7264	173.5	0.1	1.20	0.00			
03017 + 3455	COU868	9.7292	174.8	0.0	1.16	0.00			
03022 + 2326	COU681	9.7399	115.5	37.9	0.74	0.01			
03046 + 3238	COU755	9.7346	85.5	1.3	0.54	0.04			
03049 + 3446	HU812	9.7292	27.5	3.8	0.33	0.07			
03049 + 3446	HU812	9.7372	25.3	3.6	0.34	0.05			
03080 + 3251	ES2456	9.7318	97.8	0.1	1.95	0.00			
03080 + 3557	HO499	9.7292	235.6	0.5	1.89	0.05			
03080 + 3557	HO499	9.7783	234.8	0.7	1.93	0.08			
03099 + 3332	COU682	9.7783	138.4	0.1	1.31	0.01			
03099 + 3332	COU682	9.7810	137.8	0.1	1.30	0.06			
03119 + 3605	HO500AB	9.8518	45.0	0.8	0.70	0.03			
03128 + 3003	MLB557	9.7264	115.2	0.1	1.73	0.01			
03138 + 3733	AG63AB	9.7372	127.1	0.0	5.13	0.01			
03138 + 3733	AG63AB	9.7399	127.3	0.0	5.17	0.02			
03138 + 3733	AG63AB	9.7427	127.2	0.1	5.17	0.01			
03138 + 3733	AG63AB	9.7753	127.3	0.1	5.14	0.02			
03138 + 3733	COU1075Aa, Ab	9.7372	41.2	0.6	0.86	0.04			
03138 + 3733	COU1075Aa, Ab	9.7399	40.1	1.0	0.86	0.00			
03138 + 3733	COU1075Aa, Ab	9.7427	40.1	0.4	0.85	0.05			
03138 + 3733	COU1075Aa, Ab	9.7753	40.2	0.5	0.85	0.05			
03150 + 3543	HO502	9.7318	15.5	0.6	0.86	0.03			
03161 + 3654	COU1076	9.7783	90.9	0.1	1.17	0.00			
03161 + 3654	COU1076	9.7810	91.1	0.2	1.15	0.06			
03161 + 3654	COU1076	9.8463	91.3	0.3	1.13	0.01			
03162 + 2815	COU557	9.7346	356.6	0.5	0.87	0.01			
03162 + 2815	COU557	9.7372	357.4	0.2	0.87	0.01			
03166 + 2528	COU558	9.7454	87.0	7.9	0.52	0.10			
03176 + 3407	COU1077	9.7427	54.7	1.0	2.46	0.19			
03188 + 2617	COU559	9.7753	97.3	0.6	0.69	0.01			
03188 + 2617	COU559	9.8518	97.2	0.5	0.69	0.01			
03230 + 3521	ES273	9.7264	257.0	0.1	2.83	0.00			
03231 + 3234	COU756	9.7318	244.3	0.1	1.51	0.01			
03238 + 2605	COU464	9.7346	288.8	1.5	0.39	0.02			
03238 + 2605	COU464	9.7372	289.6	1.5	0.39	0.04			
03238 + 2605	COU464	9.7399	288.5	1.0	0.38	0.03			
03252 + 3837	COU1383	9.7372	281.8	0.4	0.75	0.02			
03258 + 3044	A979	9.7264	269.4	0.2	1.73	0.01			
03279 + 3229	TDS114	9.7264	165.7	0.5	0.91	0.01			
03285 + 3738	HU1059	9.7454	160.8	1.9	0.86	0.06			
03295 + 2638	COU685	9.7346	248.0	0.0	2.62	0.00			
03297 + 3846	COU1384	9.7346	45.9	1.5	0.37	0.03			
03297 + 3846	COU1384	9.7400	44.9	1.7	0.38	0.01			
03310 + 2937	A983	9.8518	139.7	1.6	0.47	0.02	−0.4	0.00	(Docobo & Ling 2010)
03317 + 3041	COU757	9.7372	50.3	4.1	0.23	0.06			
03332 + 2817	HO14	9.7346	25.9	0.2	2.15	0.01			
03333 + 3643	COU1224	9.7783	215.0	0.4	0.44	0.04			
03333 + 3643	COU1224	9.7810	215.1	1.1	0.43	0.02			
03333 + 3643	COU1224	9.8518	214.2	0.6	0.43	0.03			
03343 + 2625	OL152	9.7810	49.7	0.3	2.32	0.11			
03343 + 2625	OL152	9.8463	49.2	0.5	2.40	0.05			
03343 + 2625	OL152	9.8545	49.6	0.3	2.32	0.03			
03349 + 2406	COU467	9.7427	91.6	0.4	2.03	0.04			
03353 + 2651	COU688Aa, Ab	9.7264	199.5	1.4	0.47	0.04			
03353 + 2651	COU688Aa, Ab	9.7372	199.3	6.5	0.50	0.13			
03354 + 3529	POP83	9.8518	272.8	7.0	0.42	0.04			
03372 + 2954	COU689	9.7264	176.7	6.1	0.27	0.03			
03372 + 2954	COU689	9.7400	176.7	12.8	0.22	0.02			
03381 + 3416	COU872	9.7319	124.3	0.3	1.21	0.04			
03414 + 2602	TDS2629	9.8464	268.7	0.9	1.42	0.04			
03439 + 2313	TRU1	9.7810	315.4	0.3	1.52	0.07			
03446 + 3210	BU880AB	9.8518	18.8	1.0	0.61	0.05			

TABLE 2 (CONTINUED)

WDS (2000)	Discoverer designation	Epoch +2000	θ (deg)	σ_θ (deg)	ρ (arcsec)	σ_ρ (arcsec)	$\theta_O - \theta_C$ (deg)	$\rho_O - \rho_C$ (arcsec)	Ref.
03456 + 2839	COU692	9.7427	317.8	0.2	1.69	0.01			
03463 + 2529	COU561	9.7783	161.2	1.3	1.87	0.06			
03463 + 2850	COU693	9.7454	346.8	0.9	0.55	0.02			
03483 + 2513	COU81	9.8546	236.7	1.5	1.06	0.08			
03491 + 3216	STT516	9.7319	43.6	0.3	2.18	0.06			
03493 + 2930	MLB684	9.7783	298.9	0.6	1.53	0.04			
03493 + 2930	MLB684	9.8546	298.6	0.3	1.53	0.04			
03500 + 2351	STT64AB	9.7428	233.6	2.3	3.32	0.18			
03509 + 2309	COU695	9.7347	199.9	0.7	0.57	0.03			
03509 + 2309	COU695	9.7373	199.7	0.4	0.56	0.02			
03509 + 2309	COU695	9.7754	198.5	0.4	0.55	0.03			
03510 + 3234	HU814	9.7400	89.1	7.5	0.88	0.01			
03511 + 3548	BRT3238	9.7319	283.9	0.0	2.45	0.00			
03520 + 2801	COU696	9.8546	21.6	2.7	0.26	0.06			
03535 + 3538	ES2460	9.7319	309.7	0.1	3.07	0.01			
03553 + 2837	COU698	9.7428	348.7	0.4	1.85	0.04			
03553 + 3508	HU606	9.7265	34.2	0.1	3.00	0.01			
03559 + 3209	BU540AB	9.7319	320.5	0.4	1.36	0.03			
03561 + 3424	COU874	9.8546	219.7	2.0	0.29	0.05			
03583 + 3245	HO505	9.7265	197.9	0.4	1.60	0.04			
04009 + 3618	COU1081	9.8519	26.2	3.5	0.17	0.04			
04010 + 3415	ES237	9.7320	336.8	0.1	2.43	0.01			
04022 + 2808	STF481AB	9.7428	106.2	0.9	2.58	0.15			
04034 + 3414	COU878	9.7265	247.2	4.5	0.28	0.06			
04037 + 3448	TDS2734	9.7320	15.2	0.0	1.72	0.00			
04041 + 3657	COU1392	9.7347	148.3	4.3	0.91	0.08			
04041 + 3657	COU1392	9.7373	147.9	1.5	0.88	0.05			
04041 + 3657	COU1392	9.7400	147.9	1.1	0.90	0.02			
04041 + 3657	COU1392	9.7754	145.6	3.8	0.90	0.08			
04057 + 2824	BU1277AB	9.7784	253.7	0.6	1.54	0.05			
04059 + 3438	ES238	9.7265	137.4	0.1	1.82	0.00			
04062 + 3521	TDS2749	9.7320	145.1	0.5	1.11	0.05			
04066 + 2331	COU564	9.7428	0.7	4.0	1.66	0.21			
04081 + 3407	COU1082	9.8519	57.0	13.5	0.30	0.04			
04087 + 3227	HU1076	9.8519	334.7	0.9	0.45	0.01			
04089 + 2911	BU1232	9.7265	354.8	4.0	0.34	0.03	8.0	−0.07	(Muller 1978)
04091 + 2839	HO326	9.7320	290.7	1.4	0.40	0.03	−1.1	0.00	(Hartkopf, Mason, & Rafferty 2008)
04095 + 3723	COU1395	9.7400	250.5	0.7	0.65	0.03			
04130 + 3459	COU1225	9.7347	37.8	0.3	0.82	0.03			
04135 + 3617	COU1226	9.7784	245.9	2.3	0.30	0.02			
04135 + 3617	COU1226	9.8465	243.1	2.9	0.31	0.03			
04135 + 3617	COU1226	9.8547	247.6	2.1	0.32	0.01			
04145 + 3342	COU1084	9.7455	53.3	4.8	0.27	0.08			
04158 + 2331	BU86AB	9.7811	49.2	0.1	4.34	0.21			
04159 + 3142	STT77AB	9.7265	293.3	5.5	0.54	0.05	−1.1	−0.02	(Starikova 1985)
04196 + 3709	COU1396	9.7400	15.6	2.3	0.77	0.00			
04198 + 3140	COU881	9.7784	30.7	1.3	0.91	0.06			
04202 + 3628	HU1078	9.7811	114.6	3.0	0.44	0.02			
04202 + 3628	HU1078	9.8465	113.9	2.5	0.41	0.04			
04207 + 3637	COU1397	9.7455	222.5	0.3	0.50	0.07			
04245 + 3007	HO15	9.7265	145.1	0.7	0.78	0.02			
04248 + 3015	TDS2842	9.7812	161.1	0.9	1.23	0.06			
04301 + 2515	TDS2873	9.7373	285.7	0.3	1.11	0.02			
04301 + 3324	TDS2872	9.7456	74.2	9.0	0.44	0.10			
04307 + 3041	KU18	9.7784	65.7	0.2	1.39	0.03			
04331 + 2410	GHE13Aa, Ab	9.8547	303.0	6.4	0.38	0.04			
04378 + 3116	COU883	9.7320	59.4	2.6	0.27	0.03			
04395 + 3408	COU1085	9.7401	261.5	1.7	0.50	0.03	0.1	0.12	(Couteau 1999)
04427 + 2441	COU82	9.7401	358.4	1.0	0.57	0.04			
04427 + 2441	COU82	9.7755	359.0	1.6	0.57	0.03			
04460 + 2619	COU707	9.7320	204.1	3.4	0.35	0.07			
04460 + 2619	COU707	9.7374	202.7	1.4	0.41	0.05			
04460 + 2619	COU707	9.7401	202.4	1.6	0.37	0.02			
04460 + 2619	COU707	9.7428	201.8	2.2	0.36	0.04			
04460 + 2619	COU707	9.7755	203.7	7.8	0.33	0.08			
04464 + 2950	MLB686	9.7784	241.5	0.1	2.17	0.00			
04464 + 2950	MLB686	9.7812	241.6	0.1	2.17	0.11			
04522 + 3613	HDS628	9.7374	338.5	1.3	0.81	0.04			
04536 + 2951	MLB747	9.7320	259.8	0.1	2.04	0.00			
04538 + 3325	COU884	9.7456	163.6	0.3	0.94	0.01			
04571 + 3413	HO16	9.8520	36.6	7.9	0.28	0.08			
04572 + 2457	HDS643	9.7429	328.5	4.0	0.35	0.02			
04580 + 2935	COU886	9.7429	262.5	2.1	0.65	0.03			
04581 + 2618	COU758	9.7785	143.6	1.9	0.35	0.04			

TABLE 2 (CONTINUED)

WDS (2000)	Discoverer designation	Epoch +2000	θ (deg)	σ_θ (deg)	ρ (arcsec)	σ_ρ (arcsec)	$\theta_O - \theta_C$ (deg)	$\rho_O - \rho_C$ (arcsec)	Ref.
04581 + 2618	COU758	9.8520	143.9	2.9	0.35	0.02			
04595 + 2516	COU568	9.8520	161.0	0.1	0.80	0.00			
05020 + 2817	A480	9.7755	332.9	14.4	0.73	0.12			
05029 + 2802	COU759	9.7785	258.0	0.2	1.40	0.02			
05043 + 3428	COU1230	9.8520	83.8	5.5	0.31	0.03			
05049 + 3054	COU888Aa, Ab	9.8548	306.5	3.1	0.31	0.03			
05063 + 3739	COU1528	9.8465	69.7	0.6	0.57	0.03			
05078 + 3723	COU1529	9.8466	359.1	0.8	0.51	0.01			
05140 + 3655	POP140	9.7755	171.3	9.0	0.29	0.03			
05147 + 3236	COU1869	9.8520	137.2	2.9	0.31	0.02			
05208 + 3329	COU1231	9.8548	159.2	2.3	0.63	0.09			
05270 + 3446	HDS715	9.8521	300.0	3.4	0.63	0.06			
05302 + 3646	COU1727	9.8548	261.5	1.5	0.29	0.02			
05550 + 3407	COU1539	9.8521	298.1	0.8	0.44	0.01			
05561 + 2901	HDS801	9.8521	348.4	2.5	0.56	0.04			
05578 + 3704	AG102	9.8466	197.3	0.1	2.98	0.00			
06003 + 3643	COU1872	9.8466	245.2	0.2	0.49	0.02			
06084 + 2709	COU1099	9.8521	14.7	0.5	0.29	0.04			
06100 + 3745	COU1734	9.8467	252.1	2.2	0.43	0.05			
06120 + 3531	HU701	9.8521	31.9	1.7	0.27	0.05			
06294 + 3512	HDS884	9.8522	163.9	19.7	0.49	0.08			
06389 + 3515	COU1550	9.8467	213.4	0.2	1.33	0.05			
06439 + 3448	COU1551	9.8522	343.7	0.4	0.57	0.01			
06473 + 3640	TDS4135	9.8522	167.4	11.5	0.36	0.14			
06538 + 2828	COU918	9.8549	148.8	2.4	0.28	0.02			
06597 + 3634	COU1880	9.8467	182.3	0.2	1.37	0.01			
07035 + 3415	HU704	9.8522	79.4	13.5	0.31	0.04			
07065 + 3736	COU2062	9.8522	245.8	4.7	0.31	0.01			
07150 + 3731	COU1882	9.8522	61.8	0.7	0.89	0.02			
07173 + 3744	COU1883	9.8523	61.2	1.1	0.68	0.02			
07282 + 3746	COU2070	9.8468	108.9	0.7	0.31	0.03			
07310 + 3644	COU1885	9.8523	352.6	0.7	0.45	0.03			
07325 + 3543	POP105	9.8523	50.0	0.2	0.74	0.01			
07384 + 3742	COU2071	9.8468	58.3	0.4	1.14	0.01			
07403 + 2621	COU1248	9.8550	288.7	1.6	0.32	0.04			
07420 + 3655	ES2158AC	9.8468	333.3	0.1	2.76	0.01			
07420 + 3655	ES2158AB	9.8468	142.4	0.3	1.08	0.01			
07493 + 3541	COU2074	9.8523	118.9	3.2	0.28	0.02			
08013 + 3613	COU1888	9.8523	161.5	0.5	0.87	0.04			
18310 + 3115	A247	9.7336	56.7	0.6	3.03	0.09			
18310 + 3115	A247	9.7336	56.8	0.9	3.02	0.07			
18335 + 3510	HO86	9.7336	210.3	38.2	0.29	0.09			
18387 + 2847	L25	9.7337	251.7	0.2	1.26	0.01			
18406 + 2636	COU641	9.7444	52.3	0.7	0.57	0.02			
18421 + 2753	TDT1009	9.7283	266.6	1.1	0.56	0.02			
18465 + 3055	A254	9.7283	48.1	0.2	2.35	0.04			
18486 + 3016	TDT1064	9.7283	163.0	0.7	0.48	0.01			
18493 + 3301	ES2287	9.7444	294.9	0.0	3.90	0.02			
18501 + 3149	A256	9.7309	59.0	0.2	2.86	0.05			
18514 + 2954	TDT1087	9.7283	203.0	0.1	1.54	0.01			
18518 + 3105	COU1012	9.7309	238.9	1.5	0.43	0.03			
19016 + 3253	HU1295	9.7309	223.1	3.3	0.27	0.03			
19023 + 3328	COU1312	9.7309	231.5	3.3	0.26	0.03			
19039 + 2642	A2992	9.7309	48.2	4.8	0.24	0.06	−10.0	0.04	(Docobo & Ling 2009)
19048 + 2944	TDT1213	9.7309	255.2	0.1	2.24	0.01			
19060 + 3354	TDS965	9.7309	165.0	0.1	1.36	0.00			
19066 + 2646	COU722	9.7310	335.2	0.7	1.03	0.03			
19078 + 3040	STF2465	9.7310	249.3	3.7	1.23	0.14			
19086 + 3008	TDT1248	9.7445	180.8	0.2	1.48	0.01			
19101 + 2443	TDT1269AB	9.7364	164.9	1.3	0.44	0.02			
19108 + 3726	COU1799	9.7417	194.0	0.3	1.40	0.03			
19129 + 3510	HU942	9.7337	277.7	1.4	1.69	0.13			
19173 + 3715	HDS2728	9.7418	117.2	4.7	0.78	0.07			
19203 + 2831	TDS982	9.7283	298.4	0.4	0.74	0.01			
19203 + 2831	TDS982	9.7445	298.5	0.3	0.75	0.03			
19221 + 2907	J770	9.7283	14.5	0.0	3.25	0.00			
19243 + 3156	COU1160	9.7283	196.1	4.7	0.56	0.09			
19246 + 3535	COU1618	9.7418	31.0	0.7	1.01	0.05			
19262 + 3542	COU1620	9.7445	296.4	0.9	1.38	0.07			
19264 + 3305	COU1317	9.7310	292.6	0.8	0.44	0.03			
19266 + 2619	HDS2763	9.7418	207.4	1.8	0.81	0.07			
19266 + 2719	STF2525AB	9.7284	289.4	0.2	2.12	0.01	0.1	0.01	(Heintz 1984)
19282 + 2942	AG380	9.7284	228.4	0.1	2.46	0.02			
19291 + 3515	TDT1489	9.7284	21.2	0.0	1.17	0.01			

TABLE 2 (CONTINUED)

WDS (2000)	Discoverer designation	Epoch +2000	θ (deg)	σ_θ (deg)	ρ (arcsec)	σ_ρ (arcsec)	$\theta_O - \theta_C$ (deg)	$\rho_O - \rho_C$ (arcsec)	Ref.
19334 + 3555	TDT1540	9.7284	90.9	0.0	2.45	0.00			
19350 + 2947	A368	9.7337	152.0	1.7	0.50	0.02			
19402 + 2611	A272AB	9.7310	193.2	0.2	1.31	0.03			
19404 + 3118	COU1164	9.7337	329.5	1.9	0.36	0.02			
19418 + 3056	TDT1645	9.7445	208.1	0.5	1.11	0.03			
19498 + 2933	TDT1784	9.7310	56.8	0.1	0.73	0.00			
19568 + 2718	COU1165	9.7284	76.7	0.5	0.90	0.01			
20001 + 3423	HU1308	9.7338	28.6	1.2	0.46	0.06			
20014 + 3206	COU1472	9.7802	191.0	3.9	1.25	0.06			
20026 + 2859	ES496	9.7310	280.1	0.1	2.97	0.02			
20027 + 2939	COU1473	9.7364	345.8	0.7	0.56	0.01			
20049 + 3334	ES2350AB	9.7310	224.1	0.3	2.40	0.03			
20101 + 2712	TDT2040	9.7284	254.6	0.1	1.81	0.00			
20102 + 2930	TDT2041	9.7311	191.5	0.1	1.18	0.00			
20106 + 3338	STT541BC	9.7338	184.4	7.5	1.75	0.18			
20141 + 3706	A1419	9.7802	33.2	0.9	0.46	0.02			
20173 + 2651	TDT2143	9.7446	111.3	4.0	0.45	0.05			
20211 + 3104	TDT2200	9.7311	54.6	0.0	1.23	0.00			
20218 + 3230	TDT2206	9.7285	214.7	0.1	0.92	0.00			
20234 + 3007	J1772	9.7311	97.2	0.1	2.44	0.01			
20235 + 3618	ES2191	9.7446	181.0	0.6	1.89	0.04			
20242 + 3720	COU2288	9.7802	96.1	3.2	0.35	0.02			
20251 + 3304	ES2353	9.7338	151.5	3.7	1.72	0.45			
20260 + 3512	COU2129	9.8538	340.0	6.2	0.22	0.07			
20302 + 2651	WOR9AB	9.7338	255.5	1.0	0.51	0.02	3.0	0.03	(Zirm 2003)
20321 + 3558	COU2133	9.7285	28.1	0.2	2.37	0.03			
20333 + 2727	HDS2935	9.7285	113.3	1.8	0.48	0.04			
20364 + 3555	TDT2414	9.7419	221.8	1.3	0.87	0.04			
20365 + 3149	TDS1085	9.7256	57.6	0.3	1.51	0.06			
20397 + 3658	A1432	9.8538	117.6	1.2	0.43	0.02			
20416 + 3000	COU1174	9.7392	29.9	1.3	0.30	0.00			
20447 + 2601	HEI182	9.7285	205.5	0.8	0.93	0.05			
20451 + 3529	COU1809	9.7285	101.9	6.2	0.71	0.07			
20451 + 3529	COU1809	9.7419	102.0	4.6	0.75	0.11			
20490 + 3619	COU1811	9.7392	254.2	1.1	0.74	0.03			
20531 + 2909	STT417AB	9.7285	27.9	0.5	0.90	0.02			
20548 + 3242	STT418	9.7285	283.7	0.4	0.99	0.02	−0.4	0.01	(Zirm 2013)
20548 + 3242	STT418	9.8456	283.8	0.3	0.99	0.02	−0.3	0.00	(Zirm 2013)
20550 + 2805	BU367AB	9.7339	150.4	5.1	0.27	0.05	−10.6	0.06	(Scardia et al. 2003)
20556 + 3809	COU2222Aa, Ab	9.7365	109.1	0.5	0.36	0.03			
20560 + 3546	COU2134	9.7392	258.3	1.8	0.53	0.03			
21000 + 3740	COU2297	9.7365	56.4	3.4	0.27	0.02			
21004 + 3022	COU1179	9.7339	357.2	0.5	0.87	0.02			
21023 + 2819	COU524	9.7447	257.4	0.2	1.33	0.01			
21061 + 2801	COU525	9.7285	167.4	0.7	1.03	0.04			
21077 + 3255	COU1330	9.7365	223.6	1.1	0.37	0.03			
21081 + 2353	TDS1118	9.8456	233.4	0.1	2.12	0.01			
21083 + 2913	COU1331	9.7285	34.2	1.3	0.31	0.05			
21083 + 2913	COU1331	9.7392	33.1	1.6	0.30	0.00			
21091 + 2922	COU1332	9.7286	21.4	2.9	0.21	0.04			
21096 + 2632	COU529	9.7392	217.6	2.4	0.35	0.03			
21104 + 3640	TDT2802	9.8538	92.0	0.2	0.49	0.00			
21126 + 3846	COU2136	9.7420	292.6	0.9	0.42	0.04			
21149 + 3702	COU1818	9.7447	30.6	0.6	1.37	0.05			
21151 + 2808	J1154	9.7257	105.6	0.4	1.77	0.04			
21161 + 3747	COU1819	9.7393	328.6	0.6	0.70	0.04			
21176 + 2915	COU835AB	9.7365	235.0	4.4	0.33	0.05			
21186 + 3430	HU769	9.8539	177.0	5.4	0.86	0.08			
21206 + 2743	A295	9.7286	251.1	7.3	0.29	0.03			
21207 + 3327	BU446AB	9.7286	258.3	0.2	3.13	0.04			
21207 + 3327	BU446AB	9.7339	258.2	0.3	3.13	0.04			
21209 + 2720	COU729	9.7257	333.5	5.3	0.26	0.04			
21209 + 2720	COU729	9.7393	315.3	3.8	0.22	0.04			
21223 + 2906	COU532	9.8539	45.8	7.0	0.31	0.08			
21245 + 3015	A1219	9.7257	311.1	0.2	1.46	0.02			
21305 + 3701	SEI1521	9.7804	225.1	0.0	2.93	0.14			
21308 + 3446	COU1479	9.7257	141.4	0.3	0.70	0.00			
21334 + 3058	COU732Aa, Ab	9.7365	265.0	2.3	0.51	0.04			
21351 + 2330	TDT3043	9.7448	62.8	0.5	0.74	0.02			
21356 + 3446	COU1481	9.7339	173.4	31.2	0.69	0.20			
21368 + 3217	COU1184	9.7366	156.8	4.0	0.23	0.01			
21379 + 2743	SKF245AC	9.7420	21.1	1.1	3.22	0.06			
21391 + 3356	COU1185AB	9.7804	55.0	0.1	1.43	0.07			
21395 + 3551	COU1335	9.7776	295.0	3.0	0.50	0.04			

TABLE 2 (CONTINUED)

WDS (2000)	Discoverer designation	Epoch +2000	θ (deg)	σ_θ (deg)	ρ (arcsec)	σ_ρ (arcsec)	$\theta_O - \theta_C$ (deg)	$\rho_O - \rho_C$ (arcsec)	Ref.
21439 + 2751	HO166	9.7286	317.3	3.4	0.15	0.11	−17.0	−0.05	(Couteau 1958)
21460 + 3626	HDS3100	9.7776	190.0	9.3	0.49	0.08			
21472 + 2409	HDS3103	9.7421	116.3	4.3	0.56	0.15			
21473 + 3451	COU1482	9.7393	56.1	1.0	0.83	0.01			
21498 + 3455	COU1484	9.7286	348.2	1.7	0.40	0.08			
21503 + 3451	ES2200BC	9.7258	181.9	0.1	1.05	0.00			
21503 + 3451	ES2200BC	9.7286	182.5	0.0	1.07	0.00			
21517 + 2856	HLD49	9.7286	340.9	0.2	2.09	0.01			
21559 + 2347	TDT3246	9.7366	98.8	0.3	0.73	0.02			
21566 + 3053	HDS3119	9.7421	34.5	1.4	0.56	0.06			
21581 + 3650	TDT3263	9.7777	163.5	0.2	0.84	0.01			
21585 + 2601	COU838	9.7393	262.2	14.6	0.22	0.03			
22020 + 2651	HO610AB	9.7258	241.0	0.5	0.65	0.03			
22020 + 2651	HO610AB	9.7340	240.9	0.3	0.64	0.02			
22020 + 3727	A1452	9.7804	288.1	0.2	1.90	0.09			
22023 + 3403	COU733	9.7804	279.1	0.1	1.78	0.09			
22041 + 3546	HDS3133	9.7393	228.9	1.6	0.42	0.03			
22044 + 3343	COU734	9.7448	302.3	1.0	0.61	0.05			
22052 + 2952	A893	9.7340	243.7	4.7	0.20	0.03	−50.9	0.00	(Baize 1986)
22059 + 2845	TDT3337	9.7366	151.6	0.4	0.67	0.01			
22063 + 2656	COU435	9.7421	12.2	2.2	1.46	0.10			
22077 + 2622	COU537	9.7258	320.3	5.1	0.25	0.03	5.1	0.01	(Docobo & Ling 2012)
22106 + 3544	COU1188	9.7258	40.4	0.6	0.47	0.04			
22106 + 3544	COU1188	9.7287	40.5	0.6	0.45	0.05			
22106 + 3544	COU1188	9.7394	40.3	0.7	0.45	0.00			
22110 + 2429	EGG4	9.7832	149.4	2.2	0.57	0.03			
22127 + 3540	COU1189	9.7448	190.2	1.2	0.84	0.05			
22131 + 3653	A1458	9.7394	340.2	0.5	0.75	0.04			
22134 + 3123	TDT3410	9.8539	199.9	4.8	0.42	0.10			
22141 + 3123	BU476	9.7287	92.6	0.1	2.81	0.01			
22146 + 2934	STF2881	9.7340	76.8	0.4	1.27	0.01			
22146 + 3133	A1230	9.7804	280.2	1.2	2.28	0.11			
22164 + 3438	COU1191	9.7259	208.5	0.9	0.48	0.04			
22175 + 3338	ES2267	9.7340	232.3	0.3	2.80	0.04			
22195 + 2531	COU436	9.7394	254.7	2.9	0.34	0.03			
22202 + 2931	BU1216	9.7287	277.4	0.4	0.91	0.01	−1.3	0.04	(Ling 2012a)
22221 + 3234	TDT3492	9.7366	329.8	0.3	0.82	0.01			
22230 + 3443	TDT3498	9.7287	159.3	0.5	0.67	0.01			
22230 + 3443	TDT3498	9.8540	159.7	0.8	0.68	0.02			
22231 + 2932	TDT3499	9.7448	53.0	0.9	0.54	0.05			
22269 + 2653	COU539	9.7340	191.4	28.1	0.65	0.35			
22273 + 3822	COU1643	9.7394	346.0	2.2	0.44	0.04			
22278 + 3227	TDT3533	9.8540	2.3	3.8	0.31	0.02			
22313 + 3820	HDS3193	9.7394	274.5	7.3	0.26	0.03			
22325 + 3500	POP39	9.7287	95.2	0.7	0.64	0.02			
22325 + 3500	POP39	9.7341	95.2	0.4	0.63	0.01			
22332 + 3356	HO293	9.7804	315.6	0.9	1.57	0.08			
22371 + 3712	A1472	9.8540	262.7	8.5	0.25	0.03			
22381 + 2856	TDT3628	9.7805	301.9	1.1	0.49	0.02			
22394 + 3524	HU779	9.7832	128.7	5.7	0.38	0.06			
22455 + 3359	HU782	9.7287	321.1	0.1	1.98	0.01			
22463 + 3319	HDS3233Aa, Ab	9.7287	126.6	1.4	0.29	0.03			
22463 + 3319	HDS3233Aa, Ab	9.7449	123.7	6.4	0.30	0.04			
22495 + 3622	COU1196	9.7394	270.3	1.3	0.53	0.03			
22524 + 2819	TDT3763	9.7259	14.0	0.2	1.58	0.01			
22524 + 2819	TDT3763	9.7287	13.4	0.2	1.56	0.02			
22537 + 2558	HDS3254	9.7394	314.4	3.8	0.25	0.04			
22542 + 3333	TDT3775	9.7314	71.8	0.0	2.27	0.00			
22567 + 3355	COU740	9.7832	108.3	0.7	2.16	0.05			
22567 + 3409	TDT3804	9.7314	337.0	0.1	2.45	0.00			
22587 + 2611	COU543	9.8541	79.9	8.9	0.23	0.04			
22599 + 2749	TDT3830	9.7314	121.5	0.4	0.49	0.02			
23009 + 3522	HU991	9.7259	298.5	0.4	0.84	0.03	−40.1	0.15	(Baize 1985)
23009 + 3522	HU991	9.7287	298.8	0.3	0.84	0.02	−39.8	0.15	(Baize 1985)
23019 + 3642	COU843Aa, Ab	9.7778	132.5	0.0	1.02	0.01			
23039 + 3510	ES2134	9.7805	119.4	0.1	1.54	0.08			
23042 + 2438	J211	9.7833	147.9	0.1	2.60	0.01			
23043 + 3744	COU1197	9.7395	165.1	1.8	0.42	0.02			
23050 + 3322	STF2974	9.7259	165.7	0.1	2.67	0.01			
23067 + 3302	COU741Aa, Ab	9.7288	191.3	0.4	0.89	0.03			
23102 + 3540	COU1198	9.7314	257.8	1.2	0.49	0.03			
23102 + 3540	COU1198	9.7341	259.2	0.3	0.49	0.01			
23102 + 3540	COU1198	9.7367	261.6	0.5	0.50	0.01			
23102 + 3540	COU1198	9.7395	259.5	0.9	0.50	0.03			

TABLE 2 (CONTINUED)

WDS (2000)	Discoverer designation	Epoch +2000	θ (deg)	σ_θ (deg)	ρ (arcsec)	σ_ρ (arcsec)	$\theta_O - \theta_C$ (deg)	$\rho_O - \rho_C$ (arcsec)	Ref.
23102 + 3540	COU1198	9.7422	260.7	2.6	0.49	0.03			
23105 + 2602	TDT3917	9.7259	160.1	0.4	1.19	0.02			
23107 + 2631	BU852BC	9.7314	321.3	0.2	1.28	0.01			
23121 + 2656	HDS3305AB	9.7288	170.5	3.4	1.30	0.12			
23121 + 2656	HDS3305AB	9.7805	169.7	3.5	1.32	0.07			
23167 + 3441	HDS3315	9.7288	211.9	2.4	0.27	0.05	4.7	0.04	(Cvetkovic 2013)
23167 + 3441	HDS3315	9.7395	207.1	1.3	0.26	0.02	−0.1	0.03	(Cvetkovic 2013)
23176 + 2726	TDT3969	9.7314	147.0	0.7	0.62	0.01			
23176 + 3315	HU790	9.7341	310.2	0.3	1.17	0.03			
23200 + 2612	COU336	9.7314	358.8	0.0	1.59	0.00			
23204 + 2915	FOX101	9.7259	45.4	0.1	2.37	0.00			
23204 + 2915	FOX101	9.7341	45.7	0.1	2.38	0.00			
23225 + 3554	COU1345	9.7288	226.2	0.4	2.39	0.05			
23225 + 3554	COU1345	9.7806	225.6	0.4	2.37	0.12			
23237 + 3739	A1483	9.8541	323.5	1.7	0.55	0.03			
23249 + 3521	COU1347	9.7314	105.8	0.9	0.54	0.01			
23249 + 3521	COU1347	9.7368	106.5	0.6	0.54	0.02			
23249 + 3521	COU1347	9.7395	106.5	0.5	0.55	0.01			
23250 + 2656	ES546	9.7260	164.8	0.0	2.35	0.00			
23250 + 2656	ES546	9.7341	165.5	0.1	2.34	0.01			
23280 + 3333	STF3015	9.7288	189.8	0.1	2.91	0.00			
23280 + 3333	STF3015	9.7314	189.5	0.1	2.91	0.00			
23285 + 3153	J3303	9.7341	279.5	0.0	1.51	0.00			
23298 + 3142	COU544	9.7422	265.3	4.2	1.08	0.07			
23326 + 3127	WNC6AB	9.7314	154.1	1.2	1.77	0.31			
23334 + 3215	TDT4096	9.7260	100.1	1.5	0.46	0.02			
23334 + 3215	TDT4096	9.7288	104.8	1.0	0.44	0.02			
23334 + 3215	TDT4096	9.7368	105.9	1.2	0.45	0.03			
23334 + 3215	TDT4096	9.7395	105.2	0.8	0.45	0.01			
23334 + 3215	TDT4096	9.7422	105.6	1.2	0.44	0.02			
23334 + 3215	TDT4096	9.7423	105.3	1.3	0.45	0.02			
23362 + 3226	A1240	9.7833	351.0	0.4	2.11	0.04			
23362 + 3226	A1240	9.7806	350.9	0.3	2.11	0.10			
23368 + 2346	HU498	9.8541	298.2	0.9	0.68	0.04			
23368 + 3045	ES401	9.7806	67.9	0.1	2.33	0.11			
23370 + 3456	ES2208	9.7288	82.6	0.0	2.86	0.00			
23379 + 2510	COU441	9.7395	11.6	0.7	0.70	0.00			
23379 + 2510	COU441	9.7423	10.4	0.9	0.71	0.04			
23409 + 3339	HU795	9.7288	227.1	0.3	2.65	0.04			
23409 + 3339	HU795	9.7314	227.0	0.3	2.65	0.04			
23413 + 3234	BU858AB	9.7342	222.7	0.6	0.85	0.01			
23469 + 3553	COU845	9.7368	123.8	0.5	0.49	0.01			
23469 + 3553	COU845	9.7395	120.7	0.8	0.49	0.01			
23470 + 3538	COU943Aa, Ab	9.7288	101.0	0.1	0.98	0.00			
23472 + 3044	A1244	9.7314	271.6	0.1	2.61	0.01			
23472 + 3044	A1244	9.7342	271.6	0.1	2.61	0.01			
23487 + 3002	COU644	9.7260	86.7	0.1	2.90	0.02			
23511 + 3147	A1246	9.7342	92.6	1.4	0.94	0.06			
23516 + 2302	COU245AB	9.7450	52.9	0.4	1.72	0.07			
23528 + 3841	A1496AB	9.7395	155.8	1.8	0.40	0.02			
23538 + 2404	COU443	9.7806	144.3	0.2	2.24	0.11			
23560 + 2815	A425	9.7260	161.3	0.2	1.85	0.01			
23560 + 2815	A425	9.7342	160.9	0.1	1.85	0.01			
23573 + 2744	A427	9.7342	222.5	0.4	1.83	0.04			
23591 + 3416	HO206AB	9.7289	192.1	0.5	2.01	0.12			

ograms (Orlov et al. 2007, 2010). During the observations we had good seeing conditions. We estimated the seeing was between 0.6 to 0.9 arcsec. Aberrations introduced by the telescope have similar values. As a result, long exposure images have a resolution of about 1.5 arc seconds. All the measurements were made through the R (630/120 nm) filter. After calibration we determined the pixel scale of 0.0246″/px and the detector orientation. More than half of the observed binaries have separations less than 1″. Table 1 shows how these 506 pairs are distributed according to their separations.

Table 2 contains 645 measurements of 504 pairs of stars. The first column contains the epoch-2000 coordinates in the format used in the Washington Double Star (WDS) Catalog (Worley & Douglass 1997). The second column gives the name of the star or the discoverer designation. The third column gives the epoch of the observation in fractional Besselian years. The four following columns contain the mea-

sured position angles given in degrees, the errors of their determination, the angular distances in arcseconds and the errors of their determination. The last three columns give the difference between the observations and the ephemerides calculated for the date of observation, as well as references to publications in which orbital elements can be found (Hartkopf & Mason 2003).

3. CONCLUSION

We have presented the results of binary star observations focused on binaries from the WDS catalogue. In particular, we have been interested in the new binaries discovered by Hipparcos. We confirmed 52 new binaries detected by Hipparcos.

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