Bull. Astron. Belgrade № 156 (l997), 189 – 204

UDC 521.328
Preliminary report

ORBITAL ELEMENTS OF 6 DOUBLE STARS

G. M. Popović, R. Pavlović and V. Živkov

Astronomical Observatory, Volgina 7, 11000 Belgrade, Yugoslavia

(Received: September 17, 1997)

SUMMARY: The orbital elements and the corresponding astrophysical quantities are given for the following double stars: Hn 4 = ADS 795, β 302 = ADS 805, A 926 = ADS 832, 95 *Ceti* = AC 2 = ADS 2459, OΣ 358 AB = ADS 11484, and AGC 14 = ADS 16957.

1. INTRODUCTION

The orbital elements of the systems 95 Ceti = AC2 = ADS 2459 and O 358 AB = ADS 11483 are amended, previously known, ones. The orbital elements of other systems are calculated for the first time.

The elements are derived using the method Popović & Pavlović (1995a) and Eichhorn & Xu Yu–lin (1990). The absolute visual magnitudes, masses and parallaxes are obtained according to relations in Angelov (1993) except for the systems ADS 832, ADS 2459 and ADS 16957. To these systems we applied the Heintz's relationship (Heintz, 1978).

All orbital elements ara published in the following numbers of I.C.IAU, Comm. 26: *No* 129, 130, 131 and 132.

The presentation of orbital elements, corresponding astrophysical quantities, measurements and ephemeris (Tables 1, 2, 3) is identical to the one given in Popović, Pavlović (1995a, 1995b).

The orbital elements are given for the epoch 2000.0.

The comments concerning to the analysis of the systems are given following the tabular presentations.

The measurements as well as the apparent orbits are presented graphically (Figs 1–6). The line of nodes (Ω) and the periastron position (Π) are marked in each Figure.

2. ORBITAL ELEMENTS, MEASUREMENTS, EPHEMERIS

Table 1 Orbital elements, masses and parallaxes

Name	Hu 4	β 302	A 926
ADS	795	805	832
WDS	00576+5424	00583+2124	01011+6022
m	9.0 – 9.5	6.7 – 8.1	8.6 – 9.0
Sp.	G0	A2V	F5IV
$P(y)$	459.762	449.821	750.202
$n(^\circ/y)$	0.78301	0.80032	0.47987
T	1991.747	2040.00	2640.850
$a(''')$	0.748	0.5506	0.5475
e	0.858	0.374	0.453
$i(^\circ)$	39.16	21.55	33.45
$\Omega(^\circ)$	105.89	62.71	55.81
$\omega(^\circ)$	186.39	185.16	171.02
A	$0''.26562$	$-0''.21053$	$-0''.36287$
B	-0.69710	-0.50840	-0.40726
F	0.53139	0.47593	0.32521
G	0.23788	-0.18989	-0.32425
C	$\mp$0.05259	$\mp$0.01817	$\pm$0.04711
H	$\mp$0.46936	$\mp$0.20138	$\mp$0.29809
$T_1(y)$	2168.05	2251.81	2309.73
$T_2(y)$	1991.43	2037.28	2647.16
$M_A(mag)$	3.9	0.5	1.8
$M_B(mag)$	4.4	1.9	2.2
$\mathfrak{M}_A\odot$	1.2	2.5	1.9
$\mathfrak{M}_B\odot$	1.1	1.8	1.7
$\pi(''')$	0.010	0.006	0.004
Author	Popović& Živkov	Popović& Pavlović	Popović& Pavlović

Table 1 (continued)

Name	AC 2AB	OΣ 358AB	AGC 14
ADS	2459	11483	16957
WDS	03184-0056	18359+1659	23440+2922
m	5.5 – 7.7	6.8 – 7.2	5.0 – 7.8
Sp.	G9IV	F8V	G8III
$P(y)$	282.42	304.63	630.15
$n(^\circ/y)$	1.27472	1.18176	0.57129
T	2138.23	2105.00	2247.71
$a(''')$	0.978	1.398	1.614
e	0.270	0.546	0.112
$i(^\circ)$	64.82	131.67	60.64
$\Omega(^\circ)$	72.76	25.42	172.55
$\omega(^\circ)$	0.00	41.84	241.27
A	$0''.29000$	$1''.20708$	$0''.85925$
B	0.93454	-0.11291	0.58747
F	-0.39761	-0.54514	-1.35404
G	0.12339	-1.02592	0.56068
C	-0.00000	0.69675	-1.23352
H	0.88552	0.77817	-0.67617
$T_1(y)$	2138.23	2095.69	2435.12
$T_2(y)$	1997.02	2172.87	2159.30
$M_A(mag)$	1.6	3.6	0.9
$M_B(mag)$	5.6	4.0	4.0
$\mathfrak{M}_A\odot$	1.9	1.2	2.3
$\mathfrak{M}_B\odot$	0.9	1.2	1.2
$\pi(''')$	0.016	0.023	0.015
Author	Popović& Živkov	Pavlović& Živkov	Popović& Pavlović

Table 2 Measurements and $(O-C)$

t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
ADS 795 = WDS 00576+5424 = HLD 4						
1881.58	125º0	0″.97	3	β	1º66	-0″.12
1888.86	123.6	1.25	3	Com	-0.86	0.20
1909.20	124.5	0.94	10	A5,Fox4,Sto1	-3.61	0.01
1913.8	132.8	0.78	1	GrO	3.72	-0.12
1953.90	143.5	0.51	4	VBs	0.63	-0.04
1955.91	140±	0.6±	1	Mul	-4.09	0.07
1956.05	140.8*	0.57±	1	Mul	-3.38	0.05
1959.80	149.6	0.50	5	hz	2.83	0.02
1962.30	153.5	0.47	4	VBs	4.72	0.02
1963.834	150.8	0.40	4	Wor	0.65	-0.03
1968.99	157.9	0.35	3	hz	2.12	-0.02
1971.82	162.7	0.32	3	hz	2.85	-0.01
1976.82	174.2	0.21	3	hz	4.22	-0.05
1977.862	173.3	0.24	4	Wor	0.48	-0.01
1979.85	180.5	0.18	3	hz	1.17	-0.04
1983.892	194.4	0.16	1	Cou	-5.17	0.00
1984.90	208.1	0.15	2	?	1.21	0.00
1987.7596	227.5	0.125	1	McAlister	-7.44	0.00
1988.661	242.5	0.111	1	McAlister	-3.67	0.00
1991.904	293.8	0.102	1	Har	0.60	0.00
ADS 805 = WDS 00583+2124 = β 302						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1876.27	92º5	0″.75	4	D	1º66	0″.05
1883.53	94.3	0.82	5	En	0.34	0.13
1887.53	97.0	0.61	6	Sp	1.27	-0.07
1888.32	99.9	0.89	7	HStruve	3.81	0.21
1889.02	97.1	0.66	8	Sp	0.70	-0.02
1898.01	101.0	0.58	2	Brown	0.43	-0.08
1903.1	105.4	0.54	10	GrO	2.37	-0.11
1903.58	103.0	0.58	3	Bowyer	-0.27	-0.07
1908.74	106.6	0.65	10	Frm1,Wz1,Dob3,Doo2,J3	0.73	0.01
1912.06	109.1	0.59	27	J10,Vdk2,GrO7,Dob2,Rabe6	1.51	-0.04
1917.17	112.2	0.66	3	VBs	1.87	0.04
1922.57	112.9	0.57	13	Plq2,Mag3,Bail2,GrO3,A1,Chan2	-0.45	-0.04

* – quadrant reverse.

Table 2 (continued)

ADS 805 = WDS 00583+2124 = Oβ 302						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1926.96	116º3	0″.65	4	Rabe	0º39	0″.06
1933.65	123.5	0.65	3	Bz	3.48	0.07
1944.84	126.8	0.54	2	VBs	-0.71	-0.00
1948.898	130.51	0.64	2	Rabe	0.05	0.11
1949.830	133.7	0.56	2	Markowitz Wm.	2.55	0.03
1950.014	129.04	0.62	4	Rabe	-2.25	0.09
1950.80	138.3	0.55	5	hz	6.41	0.02
1953.87	132.7	0.57	3	Cou	-1.55	0.05
1953.948	131.12	0.58	6	Rabe	-3.19	0.06
1957.962	135.60	0.52	5	Rabe	-1.94	0.02
1961.795	136.9	0.45	1	Hol	-3.87	-0.04
1961.97	141.9	0.59	5	hz	0.98	0.10
1965.88	141.6	0.50	3	Cou	-2.78	0.02
1971.769	148.6	0.53	1	Ole	-1.31	0.07
1976.89	154.1	0.57	3	hz	-0.97	0.12
1980.867	161.3	0.39	3	Wor	1.99	-0.05
1986.901	169.4	0.45	3	Wor	3.24	0.03
1986.8887	165.7	0.427	1	McAlister...	-0.45	0.01
1987.7596	167.2	0.420	1	McAlister...	0.02	0.00
1987.86	167.8	0.52	3	hz	0.50	0.10
1988.6661	168.9	0.416	1	McAlister	0.64	-0.00
1989.7119	170.5	0.413	1	Har	0.97	-0.00
1991.8961	173.0	0.403	1	Har	0.77	-0.01
ADS 832 = WDS 01011+6022 = A 926 = 95 *Ceti*						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1905.62	248º4	0″.25	3	A	2º73	-0″.05
1915.69	258.2	0.28	2	A	0.99	-0.03
1947.06	290.8	0.38	4	VBs	0.03	0.05
1955.91	–	<0.26	1	Mul	–	–
1958.20	299.4	0.30	3	VBs	-2.03	-0.04
1961.697	300.6	0.38	3	Wor	-4.00	0.03
1964.05	300.2	0.39	3	hz	-6.49	0.04
1968.94	311.8	0.34	4	hz	0.91	-0.02
1971.702	314.8	0.33	4	Wor	1.61	-0.03

Table 2 (continued)

ADS 832 = WDS 01011+6022 = A 926 = 95 *Ceti*						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1973.86	317º4	0″.41	3	hz	2º45	0″.04
1975.82	314.9	0.38	3	hz	-1.62	0.01
1981.80	327.0	0.39	3	hz	5.88	0.01
1983.7104	322.0	0.388	1	McA	-0.54	0.01
1985.8402	323.5	0.384	1	McA	-0.59	0.00
1987.7570	325.2	0.379	1	McA	-0.25	-0.01
1988.6606	326.3	0.387	1	McA	0.21	0.00
ADS 2459 = WDS 03184−0056 = AC 2AB						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1854.81	73º1	±0″.7	2	Da	1º94	-0″.01
1877.96	Single with 900,18.5 in.		1	β	–	–
1878.85	Single, 18.5-in.		2	β	–	–
1881.83	Single or very doubtful, 12-in		1	β	–	–
1886.74	Single with 26-in.		2	Lv	–	–
1888.38	141.7	±0.21	3	Sp	23.17	-0.24
1888.77	117.8	0.45	2	β	-1.71	0.00
1889.96	Single		1	Sp	–	–
1890.88	Single with 36-in.		2	β	–	–
1891.73	Single with 36-in.		1	β	–	–
1895.65	149.3	±0.30	11	Sp	9.86	-0.09
1897.83	148.2	0.42	1	See	1.55	0.03
1897.83	147.5	0.51	1	Boothroyd	0.85	0.12
1898.15	136.7	0.51	2	A	-11.03	0.13
1899.82	157.0	0.35	2	See	3.60	-0.03
1900.63	No trace of companion.		1	A	–	–
1900.78	155	Suspected	1	A	–	–
1901.76	Single with 2400,36-in.		2	A	–	–
1905.98	202.3	0.36	1	Ol	28.50	-0.04
1908.24	177.3	0.37	2	A	-3.26	-0.05
1914.63	194.9	0.50	2	A	-1.62	0.02
1918.90	201.6	0.50	2	VBs	-3.13	-0.04
1921.69	210.6	0.52	2	A	1.38	-0.06
1925.82	216.0	0.63	5	Mag3,A1,B1	1.15	-0.01
1925.627	216.5	0.59	1	VBs	1.89	-0.04
1930.799	213.3	0.70	4	B	-7.08	-0.01

Table 2 (continued)

ADS 2459 = WDS 03184−0056 = AC 2AB						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1931.039	216º1	0″.71	2	B	-4º52	-0″.00
1932.936	226.5	0.86	1	B	4.07	0.12
1935.010	222.1	0.77	5	B	-2.17	0.00
1935.12	219.6	0.77	3	Bz	-4.76	-0.00
1935.657	219.1	0.76	4	V	-5.71	-0.02
1941.440	227.4	0.83	5	B	-1.77	-0.03
1941.906	219.2	0.79	1	VBs	-10.29	-0.07
1943.783	232.2	0.76	1	VBs	1.47	-0.13
1948.988	233.2	0.92	2	B	-0.64	-0.03
1951.920	233.1	0.93	1	Mar	-2.32	-0.05
1952.870	236.9	1.07	1	Mar	0.99	0.08
1956.110	236.0	0.96	4	Bz	-1.51	-0.07
1957.200	237.9	1.06	3	Wor	-0.12	0.02
1957.731	237.1	1.08	3	B	-1.17	0.04
1959.660	240.7	1.12	4	Wor	1.56	0.06
1960.790	232.8	1.12	2	Dj	-6.84	0.05
1961.120	238.9	1.14	3	Bz	-0.89	0.06
1961.694	239.6	1.05	3	B	-0.43	-0.03
1961.713	238.8	1.04	4	B	-1.24	-0.04
1961.808	236.7	0.92	1	Hol	-3.38	-0.16
1962.090	239.6	0.97	4	Hol	-0.60	-0.12
1962.940	242.5	1.06	3	C	1.93	-0.03
1962.820	239.5	1.18	4	Wor	-1.02	0.09
1966.520	246.4	1.17	2	New	-4.70	-0.00
1965.189	236.8	1.11	2	Wal.Jr.	-3.15	-0.17
1966.050	238.7	0.95	1	Wal.Jr.	4.36	0.05
1966.961	244.1	1.12	3	Wor	1.88	-0.01
1969.944	247.2	1.20	2	Wor	3.82	0.05
1972.094	242.1	1.08	4	Wor	-2.10	-0.08
1973.084	243.0	1.07	2	Hld	-0.03	0.11
1972.980	244.5	1.28	3	hz	-1.57	-0.10
1975.140	240.7	1.22	4	hz	-4.62	0.04
1975.727	247.0	1.06	2	Wor	1.47	-0.12
1975.746	245.2	1.16	4	Wor	-0.34	-0.02
1975.94	246.7	1.22	4	hz	1.09	0.04

Table 2 (continued)

ADS 2459 = WDS 03184−0056 = AC 2AB						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1976.023	241º6	1″.18	3	Hld	-4º04	-0″.01
1976.784	243.0	1.19	2	Hld	-2.91	0.00
1977.120	250.8	1.21	3	Wor	4.77	0.02
1977.930	247.3	1.27	3	hz	0.98	0.07
1979.980	247.3	1.22	3	hz	0.26	0.02
1981.86	249.4	1.35	3	hz	1.71	0.14
1984.756	254.2	1.28	4	Wor	5.52	0.06
1992.95	254.3	1.35	2	hz	2.89	0.11
ADS 11483 = WDS 18359+1659 = OΣ 358AB						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1845.41	227º0	1″.23	3	OΣ	7º09	-0″.05
1848.66	218.6	1.18	1	Da	1.14	-0.16
1857.71	214.2	1.35	1	Se	2.53	-0.15
1863.16	207.9	1.73	2	OΣ	-0.80	0.14
1866.68	207.6	1.72	4	δ	0.67	0.09
1871.57	204.7	1.72	3	δ	0.07	0.03
1872.58	203.9	1.83	2	OΣ	-0.28	0.12
1875.62	202.5	1.72	4	Sp	-0.34	-0.02
1879.62	200.9	1.78	3	Hl	-0.25	0.00
1883.95	198.4	1.85	6	Sp	-1.00	0.03
1887.65	197.5	1.77	10	Sp	-0.46	-0.07
1888.53	196.0	2.40	7	Nis	-1.62	0.55
1888.66	198.1	1.72	3	Sp	0.53	-0.13
1889.26	197.1	1.80	12	HΣ	-0.24	-0.05
1896.62	194.8	1.98	2	Pt	0.19	0.08
1898.34	192.9	1.90	3	Hu	-1.08	-0.01
1901.65	194.1	2.03	3	Doo	1.30	0.11
1901.90	191.9	1.90	19	HΣ	-0.81	-0.02
1902.52	192.7	1.83	8	Bowyer	0.21	-0.09
1903.49	192.5	1.86	2	Biesbroeck	0.35	-0.07
1904.03	191.6	2.00	4	Lohse	-0.36	0.07
1905.56	189.1	1.85	3	Doo	-2.32	-0.08
1905.94	190.5	2.03	22	Loh	-0.79	0.10
1909.64	190.2	1.88	30	Dob	0.20	-0.06
1915.01	188.0	1.91	52	Fox	-0.15	-0.04

Table 2 (continued)

ADS 11483 = WDS 18359+1659 = OΣ 358AB						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1920.11	185º6	2″.01	45	Com	-0º80	0″.05
1923.23	183.7	2.44	6	Lbz	-1.63	0.48
1923.45	185.3	1.94	25	Lv	0.05	-0.02
1926.05	184.5	2.02	44	Lv	0.14	0.07
1926.63	187.0	2.12	2	Bz	2.84	0.17
1936.62	359.8	-	3/0	Dur	179.09	-1.94
1937.73	180.3	1.89	3	Mul	-0.02	-0.04
1937.73	180.3	1.89	3	Mul	-0.02	-0.04
1937.80	178.5	1.88	2	Mul	-1.79	-0.05
1938.31	178.6	1.90	5	Mul	-1.51	-0.03
1938.67	179.8	1.88	5	Dur	-0.19	-0.05
1939.671	182.04	1.812	1	Jef(ph.)	2.40	-0.11
1940.516	181.30	1.805	1	Jef(ph.)	1.96	-0.12
1945.535	183.08	1.813	1	Jef(ph.)	5.53	-0.09
1946.49	176.3	1.87	4/3	Mul	-0.90	-0.03
1948.666	176.13	1.891	7	R	-0.28	-0.00
1949.653	175.09	1.869	9	R	-0.96	-0.02
1950.678	174.39	1.869	8	R	-1.28	-0.01
1951.614	174.17	1.887	10	R	-1.16	0.01
1951.972	174.7	1.79	4	Knu	-0.49	-0.09
1952.667	173.59	1.900	8	R	-1.35	0.03
1953.56	173.9	1.86	2	Cou	-0.70	-0.01
1953.741	172.91	1.884	8	R	-1.63	0.02
1953.76	175.1	1.79	2	Pre	0.57	-0.08
1954.677	172.52	1.856	8	R	-1.66	-0.01
1955.649	172.25	1.821	9	R	-1.57	-0.04
1955.75	173.2	1.85	3	Mul	-0.58	-0.01
1956.670	171.58	1.822	10	R	-1.85	-0.03
1957.724	172.16	1.852	6	R	-0.87	0.01
1957.730	173.7	1.80	3	Clo	0.68	-0.05
1958.348	173.5	1.99	3	Bos	0.71	0.15
1958.438	176.3	1.76	4	Bos	3.55	-0.08
1958.454	171.5	1.72	5	Bos	-1.24	-0.12
1958.583	173.2	1.73	3	Bos	0.50	-0.11
1958.605	172.4	1.79	3	Bos	-0.29	-0.05
1958.723	175.0	1.83	3	Bos	2.36	-0.01

Table 2 (continued)

ADS 11483 = WDS 18359+1659 = OΣ 358AB						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1959.50	170º8	1″.87	4	Wor	-1º54	0″.03
1959.96	172.6	1.85	10	GrO	0.44	0.02
1961.566	171.3	1.69	5	Bos	-0.24	-0.13
1963.57	170.7	1.81	4	Cou	-0.04	-0.00
1964.478	169.8	1.79	4	Wor	-0.58	-0.02
1965.408	169.7	1.86	1	DZ	-0.31	0.06
1965.460	170.1	1.79	6	Wal	0.11	-0.01
1965.469	170.2	1.79	2	Pop	0.22	-0.01
1965.652	167.7	1.83	3	Sou	-2.21	0.03
1965.652	167.7	1.83	3	Sou	-2.21	0.03
1966.433	168.2	1.68	1	Wal	-1.39	-0.11
1967.648	167.9	1.57	4	Wal	-1.20	-0.21
1971.503	165.9	1.53	1	Ole	-1.59	-0.23
1971.588	167.4	1.76	1	Pop	-0.05	0.00
1971.654	168.5	1.79	1	Erc	1.07	0.03
1971.715	167.9	1.57	2	DZ	0.50	-0.18
1974.80	167.2	1.59	5	Zul	1.13	-0.14
1976.52	164.7	1.66	4	Zul	-0.62	-0.06
1977.70	163.5	1.61	2	Zul	-1.30	-0.10
1979.48	163.3	1.67	2	Zul	-0.69	-0.02
1980.574	165.0	1.80	2	Pop	1.51	0.12
1980.58	163.0	1.76	3	hz	-0.49	0.08
1980.585	162.8	1.76	3	hz	-0.69	0.08
1980.588	163.6	1.64	4	Zul	0.11	-0.04
1981.506	163.5	1.70	3	Zul	0.44	0.02
1981.562	165.2	1.81	2	Pop	2.16	0.13
1982.918	162.3	1.57	6	Zul	-0.10	-0.09
1983.648	163.1	1.68	6	Pop	1.04	0.02
1984.138	162.3	1.68	4	Zul	0.48	0.03
1984.720	161.4	1.68	4	hz	-0.15	0.03
1985.720	160.6	1.59	5	Zul	-0.46	-0.05
1986.239	162.4	1.64	4	Pop	1.59	0.00
1986.734	161.4	1.68	4	hz	0.83	0.05
1988.464	159.74	1.592	5	Zul	0.03	-0.02
1990.082	159.1	1.66	2	Pop	0.20	0.06
1991.658	161.0	1.61	3	Pop	2.91	0.02

Table 2 (continued)

ADS 11483 = WDS 18359+1659 = OΣ 358AB						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1995.590	159º8	2″.04	1	Pav(micr.)	3º80	0″.49
1995.590	157.51	1.78	4	Pop	1.51	0.23
1995.590	156.06	1.63	3	Ziv	0.06	0.08
1995.590	163.09	1.72	3	Pav	7.09	0.17
ADS 16957 = WDS 23440+2922 = AGC 14						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1876.59	192º0	1″.45	4	D	0º25	-0″.08
1888.31	197.4	1.48	4	HΣ	1.86	0.02
1889.48	197.0	1.44	3	β	1.07	-0.02
1901.14	199.0	1.38	2	A	-1.13	-0.00
1901.50	198.0	1.39	5	Lewis	-2.27	0.01
1903.6	197.4	1.55	6	GrO	-3.68	0.19
1910.96	199.6	1.41	17	J3,Vdk3,Vou4,GrO7	-4.45	0.10
1912.76	205.4	1.37	4	Vou	0.58	0.07
1924.75	208.0	1.18	14	GrO5,B4,VBs2,Bail1,Plq2	-2.32	-0.03
1934.12	216.1	1.07	5	Bz	0.90	-0.08
1942.54	223.6	1.06	3	Vou	3.50	-0.03
1942.91	220.0	1.03	4	Bz	-0.32	-0.06
1948.72	224.2	0.93	3	Bz	0.17	-0.12
1954.889	228.17	1.04	7	R	-0.10	0.03
1955.88	232.4	1.07	2	V	3.42	0.07
1957.505	231.0	0.95	2	Bos	0.83	-0.04
1958.649	236.3	1.05	1	Bos	5.28	0.06
1958.654	233.9	0.86	1	Bos	2.88	-0.13
1958.93	234.1	0.93	3	Cou	2.87	-0.05
1959.86	234.9	0.99	4	Wor	2.97	0.01
1960.79	232.2	0.88	3	VBs	-0.43	-0.09
1961.661	233.8	0.92	4	Bos	0.50	-0.05
1963.86	240.6	1.03	3	Cou	5.58	0.07
1964.097	239.2	1.14	4	Wor	3.99	0.18
1970.778	245.6	0.96	4	Wor	4.91	0.04
1973.680	243.7	1.15	1	Ole	0.52	0.24
1974.82	244.0	0.93	3	hz	-0.18	0.02
1975.72	244.3	0.96	1	Zul	-0.67	0.05

ADS 16957 = WDS 23440+2922 = AGC 14						
t	θ_t	ϱ	n	Obs.	$\Delta\theta$	$\Delta\varrho$
1979.79	247º4	0″.86	3	hz	-1º23	-0″.03
1994.90	248.2	0.96	3	hz	-14.72	0.09
1996.850	262.2	0.55	1	Pop	-2.60	-0.32
1996.850	264.2	0.84	1	Pav	-0.60	-0.03

Table 3 Ephemeris

	ADS 795		ADS 805		ADS 832	
t	θ_t	ϱ	θ_t	ϱ	θ_t	ϱ
1998.0	16º29	0″.14	180º16	0″.39	332º34	0″.41
1999.0	24.39	0.15	181.51	0.39	332.98	0.41
2000.0	31.10	0.17	182.88	0.39	333.61	0.41
2001.0	36.70	0.18	184.26	0.39	334.23	0.42
2002.0	41.43	0.20	185.66	0.39	334.85	0.42
2003.0	45.46	0.22	187.07	0.38	335.46	0.42
2004.0	48.93	0.23	188.49	0.38	336.06	0.42
2005.0	51.96	0.25	189.94	0.38	336.66	0.42
2006.0	54.63	0.26	191.39	0.38	337.25	0.43
2007.0	56.99	0.28	192.86	0.38	337.84	0.43
2008.0	59.11	0.29	194.34	0.37	338.42	0.43
2009.0	61.02	0.31	195.84	0.37	339.00	0.43
2010.0	62.75	0.32	197.36	0.37	339.57	0.44
2011.0	64.33	0.34	198.88	0.37	340.13	0.44
2012.0	65.78	0.35	200.42	0.37	340.69	0.44
2013.0	67.12	0.37	201.97	0.37	341.25	0.44
2014.0	68.35	0.38	203.54	0.37	341.80	0.44
2015.0	69.50	0.40	205.12	0.36	342.34	0.45
2016.0	70.58	0.41	206.71	0.36	342.88	0.45
2017.0	71.58	0.42	208.31	0.36	343.41	0.45

Table 3 Ephemeris (continue)

	ADS 2459		ADS 11483		ADS 16957	
t	θ_t	ϱ	θ_t	ϱ	θ_t	ϱ
1998.0	253.°08	1.″24	154.°66	1.″52	265.°91	0.″87
1999.0	253.40	1.24	154.10	1.51	266.88	0.87
2000.0	253.73	1.24	153.54	1.50	267.84	0.87
2001.0	254.05	1.24	152.97	1.49	268.81	0.87
2002.0	254.38	1.24	152.38	1.48	269.77	0.87
2003.0	254.70	1.24	151.80	1.47	270.73	0.87
2004.0	255.03	1.24	151.20	1.46	271.69	0.87
2005.0	255.36	1.23	150.59	1.45	272.65	0.87
2006.0	255.68	1.23	149.98	1.44	273.60	0.87
2007.0	256.01	1.23	149.35	1.43	274.55	0.87
2008.0	256.35	1.23	148.72	1.42	275.49	0.88
2009.0	256.68	1.22	148.08	1.41	276.44	0.88
2010.0	257.01	1.22	147.42	1.40	277.37	0.88
2011.0	257.35	1.22	146.76	1.39	278.30	0.88
2012.0	257.69	1.21	146.09	1.38	279.23	0.89
2013.0	258.03	1.21	145.41	1.37	280.15	0.89
2014.0	258.37	1.21	144.71	1.36	281.07	0.89
2015.0	258.72	1.20	144.01	1.35	281.98	0.89
2016.0	259.07	1.20	143.29	1.34	282.88	0.90
2017.0	259.42	1.19	142.56	1.32	283.77	0.90

3. COMMENTS CONCERNING THE ANALYZED SYSTEMS

Hu 4 = ADS 795 IDS = 00517N5351 =
= WDS 00576+5424

The orbital elements of this pair are derived for the first time. The elements have been published in I. C. IAU, Comm 26, *No* 130 (Popović & Živkov, 1996). In same I. C. Olević and Jovanović (1996) have also been reported the elements of this pair with considerable shorter periode ($P = 279y$).

The measurements cover almost half apparent ellipse whereas the periastron–point is at the end of observed arc.

The ellipses according to elements by Popović & Živkov (I) and Olević & Jovanović (II) are drawn in Fig. 1.

β 302 = ADS 805 IDS = 00530N2052 =
= WDS 00583+2124

For the pair β 302 = ADS 805 the orbital elements have not been calculated. This is the first preliminary orbit which is based on the arc approximatly 90°. There are considerable discordance in distances. In ADS (Aitken, 1932) there are: $d\pi = 0.''011$ (J. – F.) and $0.''010$ (R. – M.). Our computed orbital parallax is smaller, $0.''006$.

The elements have been published in I. C. IAU, Comm. 26, *No* 132 (June 1997). In same I. C. also exists Zulević (1997) elements of this pair ($P = 481y$).

In Fig. 2 are presened orbits Popović & Pavlović (I) and Zulević (II).

A 926 = ADS 832 = IDS 00550N5949 =
= WDS 01011+6022

4. Plots of the Orbits

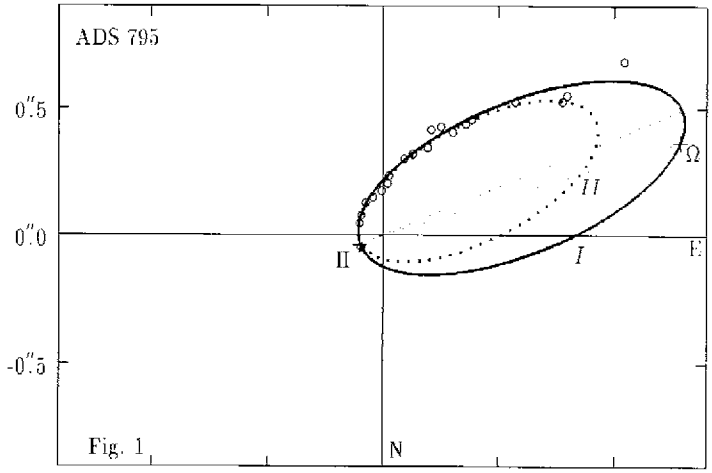

Fig. 1

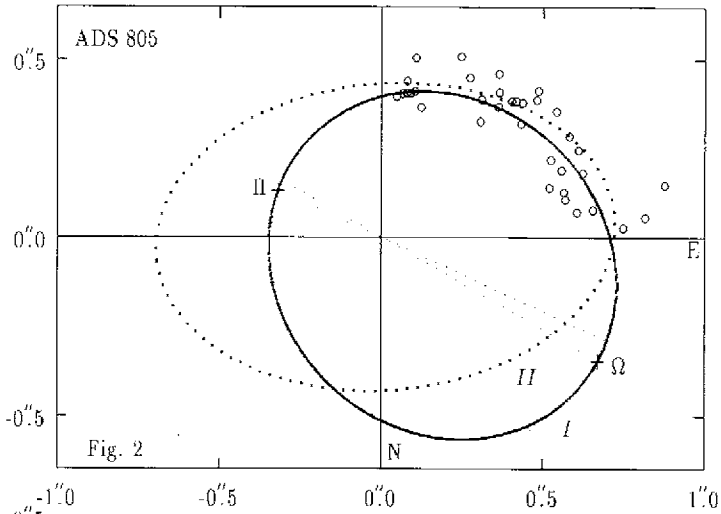

Fig. 2

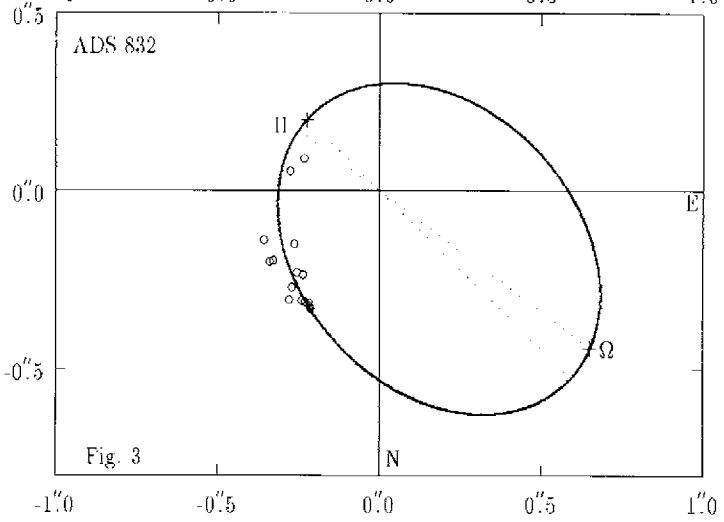

Fig. 3

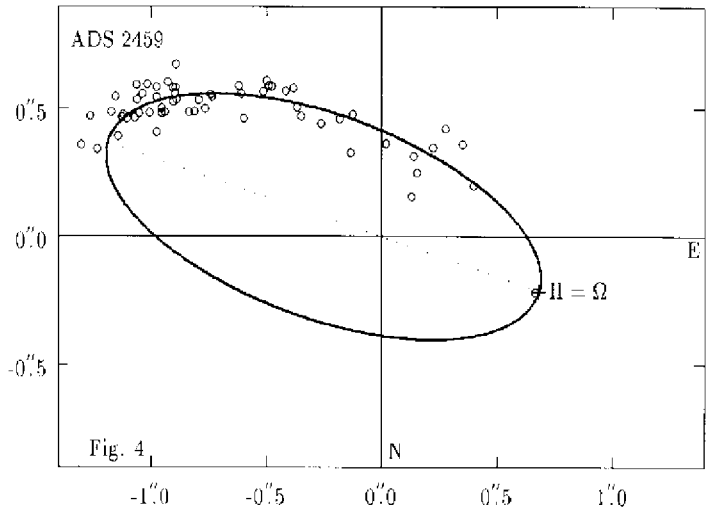

Fig. 4

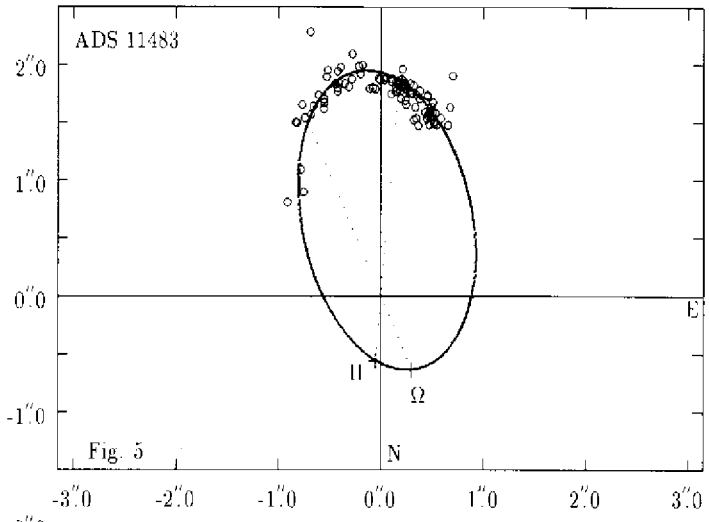

Fig. 5

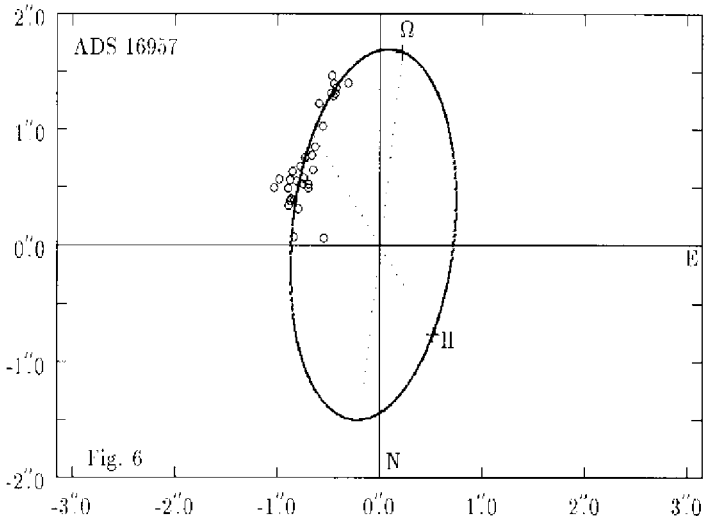

Fig. 6

Based on the change of the position angle by about 90°, we obtained the elements of this system for the first time.

The elements have also been printed in I. C. IAU, Comm. 26, *No* 132 (1997.)

The system has not been observed for a long time and requires new measuremets.

Orbital parallax is only $0''.004$.

95 Ceti = AC 2 = ADS 2459 = IDS 03132S0078 = = WDS 01011+6022

The orbital elements of this pair have been derived several times by:

1961 Eggen, $P = 200.00y$
1961 Jastrebski, $P = 217.20y$
1981 Valbousquet, $P = 351.94y$

Although the position angle has increased since its discovery 1854. by about 180°, derived orbits are not dependable enough. The pair is now at its best position for the measurement. Although, the arc is well covered with measurements tracking this pair would be useful.

78 *Peg* = ADS16957 = IDS23390N2849 = = WDS 13440+2922

The orbital elements of this pair are calculated for the first time. The elements have also been printed in I. C. IAU Comm. 26, *No* 131 (1997). The orbit is based on an arc of about 70°. Our value the of orbital parallax is $0''.014$ which is in good agreement with the parallax in ADS:$d\pi = 0''.014$ (J. – F.), $0''.012$ (R. – M.) and the spectroscopic parallax $0''.017$ (Mtw) (DAO).

Acknowledgments – We are grateful to Dr. J.A. Docobo editor in cheif of Information Cilculator IAU, Comm 26 from Observatio Astronomico "R. M. Aller", Unirvesidade de Santiago de Compostela for his having supplied additions to some series of measurements in this work.

REFERENCES

Angelov, T.: 1993, *Bull. Obs. Astron. Belgrade*, **148**, 1.
Aitken, R.G.: 1932, *New General Catalogue of Double Stars*, The Carnegie Institution of Washington
Eichhorn, H.K., Xu Yu–lin: 1990, *Astrophys. J.*, **358**, 575.
Heintz, W. D.: 1978, *Double Stars*, D. Reidel Publ. Company, p. 59.
McAlister, H.A., Hartkopf, W.I.: 1988, *CHARA Contribution* No 2.
Olević, D., Jovanović, P.: 1996, *Information Circular Commission 26*, IAU, No 130, 1
Pavlović, R., Živkov, V.: 1996, *Information Circular Commission 26*, IAU, No 129, 1
Popović, G.M., Živkov, V.: 1996, *Information Circular Commission 26*, IAU, No 130, 1
Popović, G.M., Pavlović, R.: 1997, *Information Circular Commission 26*, IAU, No 131, 1
Popović, G.M., Pavlović, R.: 1997a, *Information Circular Commission 26*, IAU, No 132, 1
Popović, G.M., Pavlović, R.: 1995a, *Bull. Obs. Astron. Belgrade*, **151**, 45.
Popović, G.M., Pavlović, R.: 1995b, *Bull. Obs. Astron. Belgrade*, **153**, 57.
Popović, G.M., Pavlović, R.: 1995, *Bull. Obs. Astron. Belgrade*, **152**, 55.
Zulević, D., Pavlović, R.: 1997, *Information Circular Commission 26*, IAU, No 132, 1.

ПУТАЊСКИ ЕЛЕМЕНТИ ШЕСТ ДВОЈНИХ СИСТЕМА

Г. М. Поповић, Р. Павловић и В. Живков

Астрономска опсерваторија, Волгина 7, 11000 Београд, Југославија

УДК 521.328
Претходно саопштење

Саопштавају се путањски елементи и одговарајуће астрофизичке величине следећих двојних система: Hn 4 = ADS 795, β 302 = ADS 805, A 926 = ADS 832, 95 *Ceti* = AC 2 = ADS 2459, OΣ 358 AB = ADS 11484 и AGC 14 = ADS 16957.