Bull. Astron. Belgrade № 155 (1997), 103 – 108

UDC 524.328
Preliminary report

PRELIMINARY ORBITAL ELEMENTS OF 5 BINARY STARS

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(Received: February 14, 1997)

SUMMARY: The orbital elements and the corresponding astrophysical quantities are given for the following binary stars: ADS 3317 = McA 18 *Aa*, ADS 4038 = McA 19 *Aa*, HR 6396 = ζ *Dra*, ADS 14121 = WCK *Aa* and +49° 3310 = McA 61.

1. INTRODUCTION

This paper reports the results of analysis of the followng binary stars, taken from Second Catalog of Interferometric Measurements of Binary Stars (Mc Alister, H. A. (1988)): ADS 3317 = McA 18 *Aa*, ADS 4038 = McA 19 *Aa*, HR 6396 = ζ *Dra*, ADS 14121 = WCK *Aa* and +49° 3310 = McA 61. Orbits of the choosen pairs were not found in Popović et al. (1996).

2. METHOD OF CALCULATION

The orbital elements were calculated using the original procedure developed by D. Olević. This theory, based on the method of Kowalski, was modified to enable calculation of the elliptic orbital elements from short arcs (the theory has not been published yet). The computer program according to this procedure was written by P. Jovanović.

3. RESULTS

The quadrants of the last 6 observations of the pair ADS 3317 = McA 18 *Aa* were changed. We also concluded that the quadrants of the last 7 observations of the pair ADS 14121 = WCK *Aa* might be changed, so we could get the optimal deviations. Basic data concerning the systems treated here, orbital elements, as well as Thiele - Innes elements A, B, F and G, are presented in Table 1. The orbital elements are given for the epoch J2000.0.

The measurements and deviations (O - C) from calculated orbits are presented in Table 3.

Table 2. gives the ephemerides for the next 5 years.

The measurements as well as the apparent orbits are presented graphically in Figures 1 - 5.

Masses and parallaxes of the pairs HR 6396 = ζ *Dra* and +49° 3310 = McA 61 were not calculated because the magnitudes and the spectra (Sp) of the components A were not found. Sums of the masses and parallaxes were calculated for the remaining pairs. We assumed that the magnitude of A component represents the total magnutude of both components in these pairs. Isolated large deviations are to be expected for the close components.

Table 1.

IDS	04357 + 0969	05271 + 1758	17088 + 6543	20397 + 1556	20331 + 4950
ADS	3317	4038	HR 6396	14121	+49° 3310
Name	McA 18 *Aa*	McA 19 *Aa*	*ζ Dra*	WCK Aa	McA 61
m	4.4	10.1	–	3.9	–
Sp.	–	–	–	–	–
$P(y)$	25.453	38.4	6.324	17.616	23.231
$n(°/y)$	14.14385	9.37155	56.92263	20.43555	15.49674
T	1987.11	1985.82	1983.85	1983.77	1993.77
$a('')$	0.236	0.119	0.072	0.164	0.045
e	0.335	0.203	0.089	0.482	0.307
$i(°)$	56.26	101.77	39.66	158.58	48.66
$\Omega(°)$	143.95	88.69	23.05	104.24	48.62
$\omega(°)$	283.36	113.96	165.41	253.84	222.99
A	0.03103	0.02111	−0.07006	−0.13047	−0.00655
B	0.13549	−0.04890	−0.01453	−0.08005	−0.03810
F	−0.20390	−0.01236	0.00434	−0.07968	0.03660
G	0.11087	−0.10866	−0.05685	0.14175	0.00865
π''_{dyn}	0.0216	0.0130	–	0.0192	–
$\sum M_\odot$	2.2	0.8	–	2.7	–
$\sum M$	1.1	5.6	–	0.3	–

Table 2.

	ADS 3317		ADS 4038		HR 6396		ADS 14121		+49° 3310	
t	θ	ρ	θ	ρ	θ	ρ	θ	ρ	θ	ρ
1997.0	219°.2	0″.173	249°.7	0″.070	218°.2	0″.065	347°.2	0″.185	6°.7	0″.031
1997.5	226.1	0.172	246.7	0.064	247.1	0.060	340.4	0.176	15.9	0.035
1998.0	233.0	0.173	243.1	0.058	281.6	0.056	332.8	0.166	23.0	0.039
1998.5	239.9	0.175	238.6	0.051	316.2	0.060	324.1	0.154	29.0	0.042
1999.0	246.6	0.178	232.9	0.045	344.0	0.069	313.8	0.141	34.2	0.045
1999.5	253.0	0.182	225.5	0.040	5.5	0.077	301.4	0.127	38.8	0.048
2000.0	259.0	0.187	215.9	0.035	24.3	0.079	285.8	0.112	42.9	0.050
2000.5	264.8	0.193	203.5	0.031	43.8	0.074	265.2	0.097	46.7	0.052
2001.0	270.1	0.200	188.5	0.029	67.6	0.064	237.6	0.084	50.2	0.053
2001.5	275.1	0.207	172.4	0.029	100.1	0.056	203.5	0.079	53.7	0.054

Table 3.

t	θ_t	ρ_t	n	Obs .	$\Delta\theta$	$\Delta\rho$
ADS 3317						
1985.8488	15°.9	0″.107			−0°.1	0″.000
1986.8865	66.2	0.089		See Ref.	+0.5	0.000
1987.7655	102.5	0.113		Mc Alister (1988)	−0.8	−0.001
1988.2601	116.8	0.136			+0.3	0.001
ADS 4038						
1979.7736	80.4	0.095			0.0	.004
1979.8540	78.3	0.099			−1.8	.010
1979.8570	83.7	0.088			+3.6	−.001
1984.8460	308.3	0.029		See Ref.	−9.6	.004
1985.7500	316.0	0.080		Mc Alister (1988)	+21.7	.039
1986.8893	281.6	0.060			−1.0	−.002
1987.2717	274.3	0.069			−5.9	.000
1988.2490	275.7	0.083			−0.1	−.001
1988.2518	96.7	0.083	1	Har94	+0.9	−.001
1988.6609	95.3	0.088	1	Har94	+1.0	−.001
1989.2374	97.4	0.093	1	Har94	+4.9	−.003
1990.2698	91.7	0.101	1	Har94	+1.9	−.002
1990.7554	86.6	0.104	1	Har94	−2.0	−.002
1991.9023	85.5	0.113	1	Har94	−0.6	.006
HR 6396						
1981.3840	32.0	0.046			−5.7	−0.030
1981.6867	55.0	0.096			+4.6	0.025
1982.5840	120.5	0.037		See Ref.	+16.4	−0.018
1983.4030	158.3	0.077		Mc Alister (1988)	−7.0	0.017
1984.7790	235.9	0.050			−6.5	−0.011
1987.2673	22.9	0.095			+1.9	0.016
ADS 14121						
1974.6500	34.5	0.224			+0.2	−0.003
1974.9000	31.8	0.241			−0.4	0.014
1975.7127	25.6	0.219			+0.5	−0.006
1976.3703	19.0	0.226		See Ref.	−0.2	0.005
1976.4551	18.6	0.219		Mc Alister (1988)	+0.2	−0.002
1976.6218	15.7	0.217			−1.2	−0.003
1976.6245	15.3	0.218			−1.6	−0.002
1977.4818	8.8	0.213			0.1	+0.001
1977.6347	6.8	0.212			−0.3	0.002

Table 3. (continued)

ADS 14121					
t	θ_t	ρ_t	n Obs .	$\Delta\theta$	$\Delta\rho$
1978.5412	357°.5	0″.199		−0°.0	0″.000
1978.6096	356.5	0.197		−0.2	−0.001
1978.6150	356.9	0.196		+0.2	−0.002
1978.6177	357.3	0.195		+0.6	−0.003
1979.5295	347.5	0.185		+2.1	0.002
1979.5329	346.4	0.181		+1.0	−0.002
1979.7700	342.9	0.180		+0.8	0.002
1980.4157	334.1	0.171		+1.7	0.006
1980.4742	333.0	0.155		+1.6	−0.009
1980.4771	330.9	0.167		−0.4	0.004
1980.7229	326.8	0.160		−0.3	0.002
1980.7843	325.0	0.153		−1.0	−0.003
1981.3700	315.0	0.136	See Ref.	+0.8	−0.005
1981.4628	312.6	0.141	Mc Alister (1988)	+0.5	0.002
1981.4683	312.7	0.137		+0.7	−0.002
1981.4737	312.1	0.140		+0.2	0.001
1981.6977	305.7	0.142		−0.7	0.010
1983.4000	300.4	0.184		+63.7	0.100
1984.7800	295.1	0.176		+146.2	0.079
1985.4929	122.5	0.121		+0.5	−0.001
1985.7440	111.1	0.160		−3.9	0.030
1985.8534	113.0	0.132		+0.8	−0.002
1986.4424	100.0	0.141		+0.6	−0.011
1986.4507	103.1	0.143		+3.9	−0.010
1986.8965	89.7	0.160		−1.6	−0.005
1987.7620	77.1	0.178		−1.6	−0.007
+49° 3310					
1980.4797	67.5	0.055		−0.6	0.001
1981.4709	76.3	0.051		+1.3	−0.001
1983.4906	72.8	0.036	See Ref.	−18.6	−0.010
1984.7018	103.2	0.042	Mc Alister (1988)	−0.6	0.000
1987.7620	149.6	0.033		+0.1	−0.000

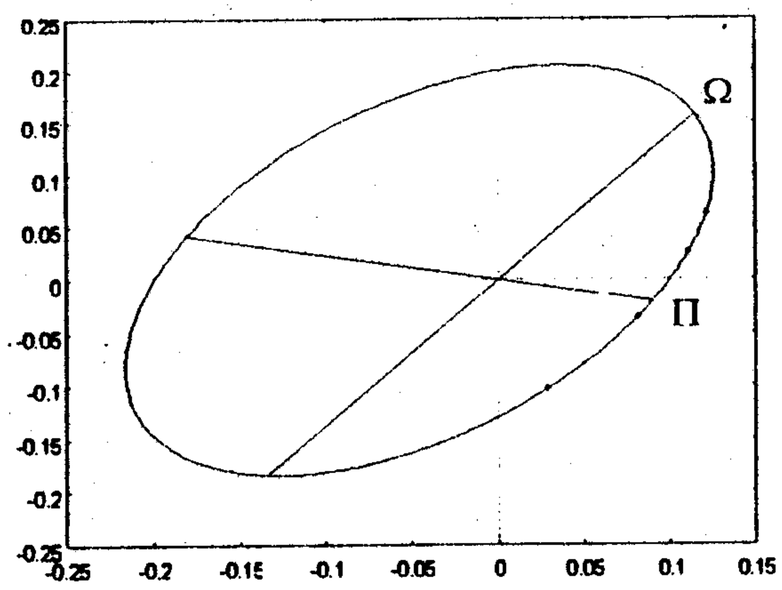

Fig. 1. ADS 3317

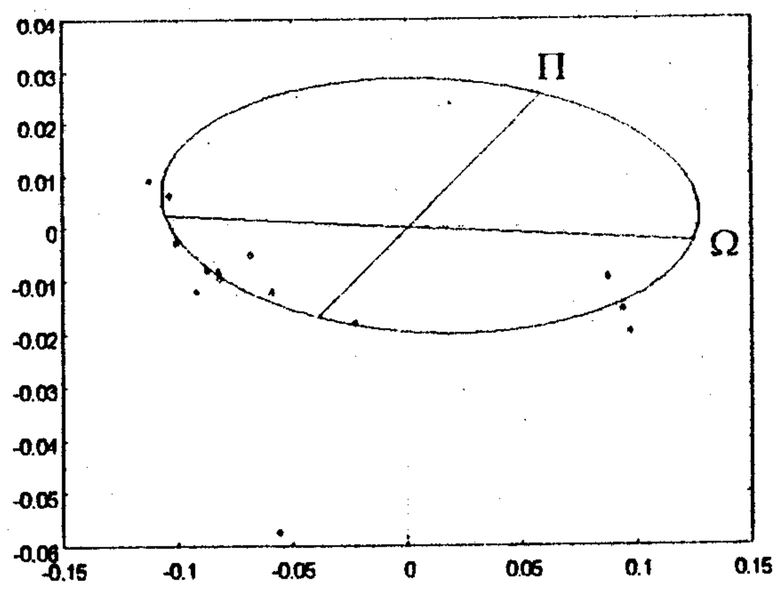

Fig. 2. ADS 4038

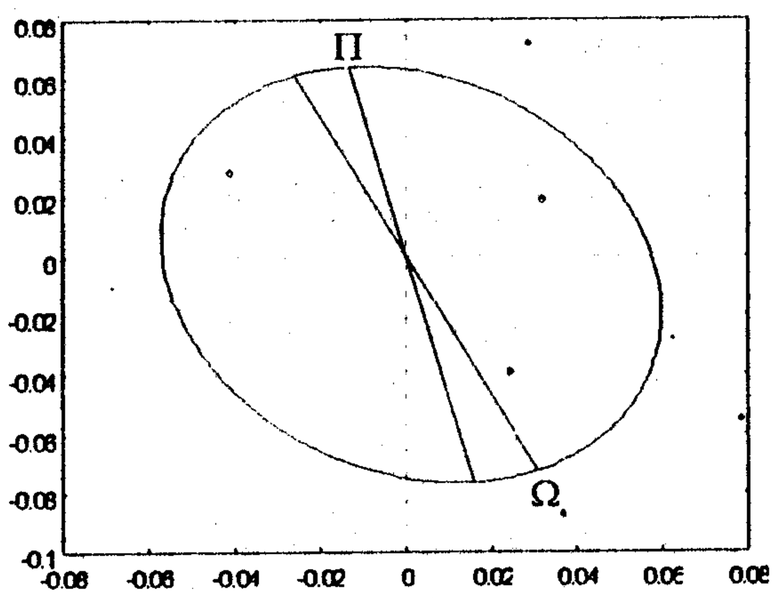

Fig. 3. HR 6396

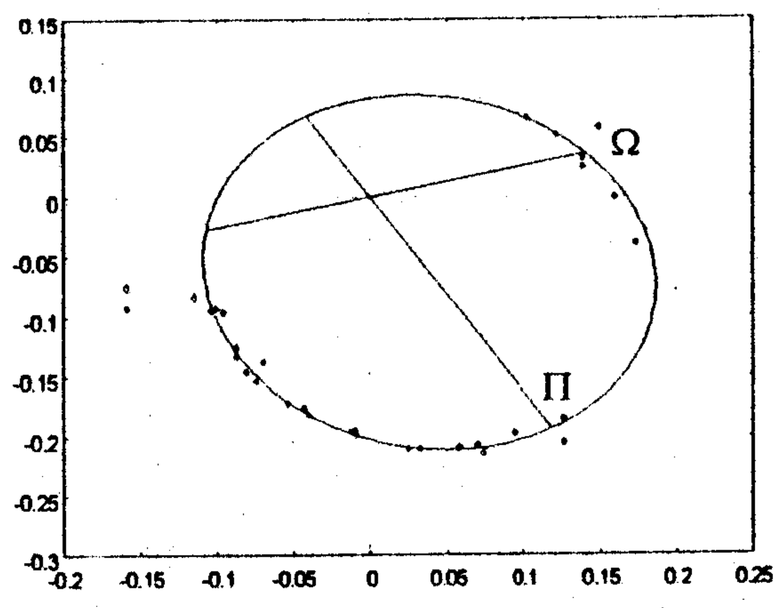

Fig. 4. ADS 14121

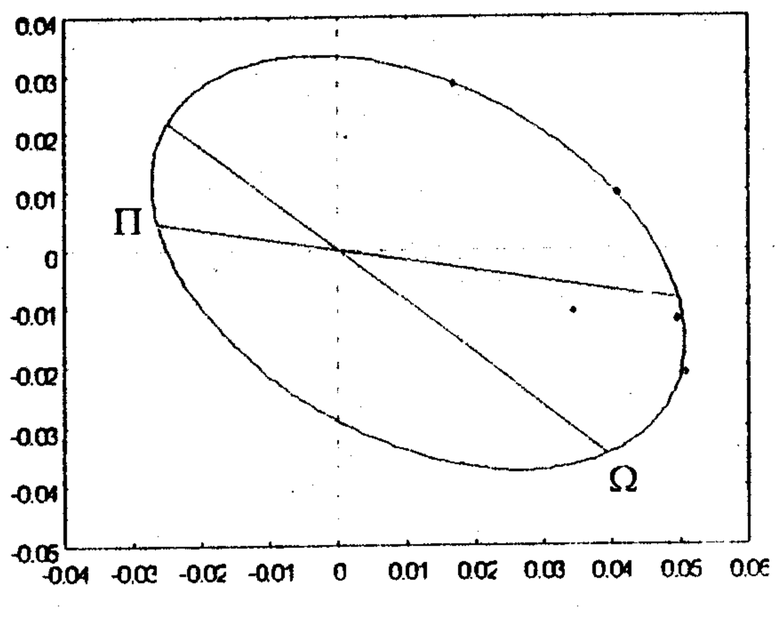

Fig. 5. +49° 3310

Acknowledgements – We would like to thank J. A. Docobo, G. Popović and R. Pavlović for providing the additional observations.

This work is a part of the project "Astrometrical, Astrodynamical and Astrophysical investigations", supported by Ministry of Science and Technology of Serbia.

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ПРЕЛИМИНАРНИ ОРБИТАЛНИ ЕЛЕМЕНТИ 5 ДВОЈНИХ ЗВЕЗДА

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Претходно саопштење

У овом раду су представљени прелиминарни орбитални елементи и одговарајуће астрофизичке величине за следеће парове двојних звезда: ADS 3317 = McA 18 *Aa*, ADS 4038 = McA 19 *Aa*, HR 6396 = ζ *Dra*, ADS 14121 = WCK *Aa* и +49° 3310 = McA 61.