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THE VARIABILITY OF THE ORBITAL PERIOD OF RZ COMAE BERENICES

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The variable star RZ Com (BD $+24^\circ$ 2475) is a W UMa-type eclipsing binary that belongs to the W sub-class. Although it is not a faint binary, ($V_{max} = 10\overset{\mathrm{m}}{.}5$), it cannot be characterised as a well observed system. Its spectral classification is not clear, since:
1) in the old study by Struve & Gratton (1948) the system is referred as K0;
2) Wood's et al. catalogue (1980) gives F7 for the primary and G0 for the secondary component, respectively;
3) Batten's et al. (1989) gives G2Vn; and
4) in Hipparcos catalogue the system is referred to as G0Vn.

On the other hand, the more recent spectroscopic study of RZ Com (McLean & Hilditch, 1983), does not give the spectral types of the two components.

From the $O-C$ diagram of the system, which is presented in Fig. 1, it is obvious that its orbital period undergoes an obvious increase during the last two decades.

From all available data, given in Table 1, and from the weighted quadratic least squares fitting, we found:

$$\text{Hel. JD(Min I)} = 2434837.4211 + 0\overset{\mathrm{d}}{.}33850481 \times E + 3.69 \times 10^{-11} \times E^2$$

that yields to a period increase of the order of $1\overset{\mathrm{d}}{.}84 \times 10^{-11}$. This increase becomes a little greater $1\overset{\mathrm{d}}{.}91 \times 10^{-11}$, if we do not take into account five points with very large scatter. These points are marked with asterisk in Table 1.

The C values, in the $O-C$ differences of Table 1, have been calculated using Kholopov's (1985) ephemeris formula:

$$\text{Hel. JD(Min I)} = 2434837.4198 + 0\overset{\mathrm{d}}{.}33850604 \times E$$

According to some old studies (Broglia 1960, Aslan & Herczeg 1984), the period of RZ Com was constant from 1934 till 1966, and equal to 0.3350604 days; while, the predominantly negative residuals from 1969 were perhaps indicating a change in the system's period (Aslan & Herczeg 1984). At the same time, Rovithis & Rovithis-Livaniou (1984), proposed a new ephemeris with a slightly bigger value for the orbital period of RZ Com. The present analysis not only confirms this, but also shows that this increase continues.

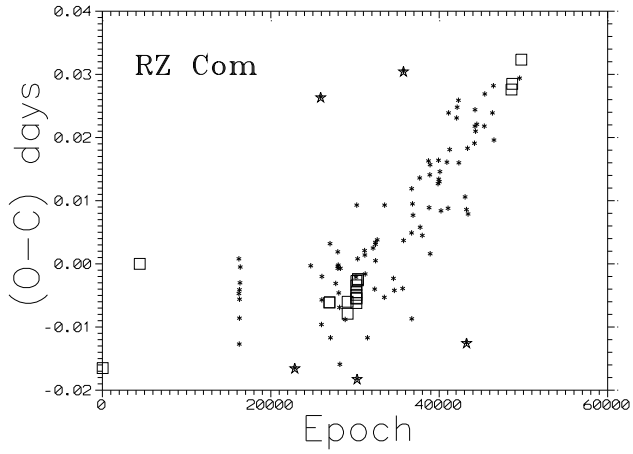

Figure 1. The $O-C$ diagram of RZ Com, based on all available data, and to Moscow (1985) ephemeris formula. Squares have been used for photoelectric minima and small stars for the visual ones. The 5 visual points that were not taken into account are plotted with bigger stars.

Most of the minima in Table 1, are visual; and although it is better to avoid using such data (because of their pure accuracy and usually large dispersion), in this particular case it is impossible to do otherwise, since the photoelectric material is very poor. New times of minimum light are needed to follow the orbital period behaviour of this interesting and rather neglected binary.

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Times of minima:

Star name	Time of min. HJD 2400000+	Error	Type	Filter	$O-C$ [day]	Rem.
RZ Com	34847.899		I		−0.017	Koch R.H., 1961.
	36341.4021		I		0.0000	Broglia P., 1960.
	40323.588		I		0.001	Baldwin M.E., 1973.
	40324.598		I		−0.005	Baldwin M.E., 1973.
	40338.638		II		−0.013	Baldwin M.E., 1973.
	40346.597		I		−0.009	Baldwin M.E., 1973.
	40347.617		I		−0.004	Baldwin M.E., 1973.
	40348.631		I		−0.006	Baldwin M.E., 1973.
	40369.621		I		−0.003	Baldwin M.E., 1973.
	40380.625		II		−0.001	Baldwin M.E., 1973.
	42571.420*		II		−0.017	Diethelm R., 1977.
	43213.413		I		−0.000	Peter H., 1977.
	43612.369*		II		0.026	Peter H., 1979.
	43642.460		II		−0.010	Peter H., 1979.
	43656.512		I		−0.006	Peter H., 1979.
	44008.383		II		−0.012	Peter H., 1979.
	43663.455		II		−0.002	Peter H., 1979.
	43964.8906		I		−0.0061	Aslan Z. & Herczeg T.J., 1984.
	43967.9372		I		−0.0061	Aslan Z. & Herczeg T.J., 1984.
	43988.426		II		0.003	Peter H., 1979.
	44214.711		I		−0.003	Locher K., 1980.
	44299.681		I		0.002	Locher K., 1980.
	44303.402		I		−0.001	Peter H., 1980.
	44316.435		II		−0.000	Locher K., 1980.

Times of minima:						
Star name	Time of min. HJD 2400000+	Error	Type	Filter	$O-C$ [day]	Rem.
RZ Com	44339.449		II		−0.005	Peter H., 1980.
	44370.420		I		−0.007	Peter H., 1980.
	44382.428		II		−0.016	Peter H., 1980.
	44402.415		II		−0.001	Peter H., 1980.
	44595.701		II		−0.009	Locher K., 1981.
	44694.3712		I		−0.0060	Derman E. et al., 1982.
	44695.3868		I		−0.0079	Derman E. et al., 1982.
	45027.465		I		−0.002	Locher K., 1982.
	45046.4173		I		−0.0062	Rovithis & Rovithis−Livaniou, 1984.
	45046.5878		II		−0.0049	Rovithis & Rovithis−Livaniou, 1984.
	45047.2652		II		−0.0045	Rovithis & Rovithis−Livaniou, 1984.
	45047.4336		I		−0.0054	Rovithis & Rovithis−Livaniou, 1984.
	45047.6027		II		−0.0055	Rovithis P. & Rovithis−Livaniou E., 1984.
	45049.2974		II		−0.0034	Rovithis & Rovithis−Livaniou, 1984.
	45049.4673		I		−0.0027	Rovithis & Rovithis−Livaniou, 1984.
	45061.327		I		0.009	Germann R., 1982.
	45076.363*		II		−0.018	Peter H., 1982.
	45100.416		II		0.001	Peter H., 1982.
	45109.3832		I		−0.0024	Rovithis & Rovithis−Livaniou, 1984.
	45110.3985		I		−0.0026	Rovithis & Rovithis−Livaniou, 1984.
	45378.500		I		0.002	Locher K., 1983.
	45389.670		I		0.001	Locher K., 1983.
	45404.392		II		−0.002	Peter H., 1983.
	45493.409		II		−0.012	Germann R., 1983.
	45718.699		I		0.002	Locher K., 1984.
	45781.316		I		−0.004	Germann R., 1984.
	45815.341		II		0.003	Germann R., 1984.
	45812.466		I		0.003	Peter H., 1984.
	45818.387		II		0.000	Peter H., 1984.
	45884.399		II		0.004	Peter H., 1984.
	46171.443		II		−0.005	Peter H., 1985.
	46180.428		I		0.009	Peter H., 1985.
	46535.340		II		−0.002	Germann R., 1986.
	46573.420		I		−0.004	Germann R., 1987.
	46908.372		II		−0.004	Germann R., 1987.
	46939.529*		II		0.030	Peter H., 1987.
	46941.384		I		0.004	Peter H., 1987.
	47266.351		I		0.005	Germann R., 1988.
	47275.477		I		−0.009	Kirby G., 1991.
	47270.420		I		0.012	Peter H., 1988.
	47303.422		II		0.010	Peter H., 1988.
	47323.392		II		0.008	Blattler E., 1989.
	47592.341		I		0.014	Peter H., 1989.
	47612.305		I		0.006	Blattler E., 1989.
	47695.407		II		0.004	Peter H., 1989.
	47946.421		I		0.016	Peter H., 1990.
	47969.432		I		0.009	Peter H., 1990.
	48001.426		II		0.014	Peter H., 1990.
	48010.398		I		0.016	Peter H., 1990.
	48014.446		I		0.002	Peter H., 1990.
	48329.437		II		0.013	Peter H., 1991.
	48348.397		II		0.016	Peter H., 1991.
	48358.380		I		0.013	Peter H., 1991.
	48385.460		I		0.013	Peter H., 1991.
	48404.418		I		0.015	Peter H., 1991.
	48447.402		I		0.008	Peter H., 1991.
	48686.395		I		0.016	Peter H., 1992.
	48733.440		I		0.009	Peter H., 1992.
	48753.427		I		0.024	Peter H., 1992.

Times of minima:						
Star name	Time of min. HJD 2400000+	Error	Type	Filter	$O-C$ [day]	Rem.
RZ Com	48795.396		I		0.018	Peter H., 1992.
	49076.361		I		0.023	Peter H., 1993.
	49097.350		I		0.025	Peter H., 1993.
	49147.450		I		0.026	Peter H., 1993.
	49167.412		I		0.016	Peter H., 1993.
	49416.547		I		0.011	Dedoch A., 1995a.
	49471.385		I		0.009	Peter H., 1994.
	49475.424*		I		−0.012	Peter H., 1994.
	49516.414		I		0.018	Paschke A., 1994.
	49537.391		I		0.008	Peter H., 1994.
	49793.482		II		0.019	Dedoch A., 1995b.
	49810.410		II		0.022	Martignoni M., 1996.
	49817.352		I		0.024	Peter H., 1995.
	49840.367		I		0.021	Peter H., 1995.
	49888.436		I		0.022	Peter H., 1995.
	50188.352		I		0.022	Peter H., 1996.
	50210.360		I		0.027	Peter H., 1996.
	50517.382		I		0.024	Peter H., 1997.
	50557.330		I		0.029	Peter H., 1997.
	50578.478		II		0.020	Dedoch A., 1997.
	51281.9016		II		0.0276	Diethelm R., 2001.
	51312.8758		I		0.0285	Diethelm R., 2001.
	51609.408		I		0.029	Paschke A., 2000.
	51676.7736		I		0.0323	Nelson R.H., 2001.

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