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THE PERIOD VARIABILITY OF THE CLOSE BINARY W SERPENTIS

The ephemeris for W Ser (HD166126:F5e Ib) can be improved beyond the representation by Wood and Forbes (1973). The published timings of minimum light available to the present authors are those derived from visual estimates by Zinner (1912, 1922),Banachiewicz (1928a,b), Lause (1930), Bauer (1945), Zacharov (1954) and Tsesevich (1955); photographic estimates by Gaposchkin (1937) and Filin (1948); visual observations by McLaughlin (1961); and photoelectric measures by Fresa (1957, 1962), Lynds (1957), Hall (1967), Walraven (1969) and Kruszewski (1972). In addition, E. F. G. observed two times (in the b-bandpass) with a photoelectric photometer equipped with an RCA 4509 multiplier at Biruni Observatory, Pahlavi University, Shiraz, Iran: 2443363.23 and 2443646.675. The photographic estimates by O'Connell (1937) were not available to the present authors. Fifty four timings of minimum light were accumulated and were assigned weights of 1, 2, and 3 according to the measurements being estimates, visual observations, or photoelectric observations, respectively. Residuals were first computed from the ephemeris:

$$\text{Pr. Min.} = 2426625.241 + 14.15782\ E, \qquad (1)$$

and these residuals were then subjected to least squares polynomial fitting. A quadratic fit is definitely inferior to a cubic one and the latter is shown among the residuals in the figure. The improved ephemeris becomes:

$$\text{Pr. Min.} = 2426625.493 + 14.15486E + (3.140\times10^{-6})E^2 + (1.432\times10^{-9})E^3. \qquad (2)$$

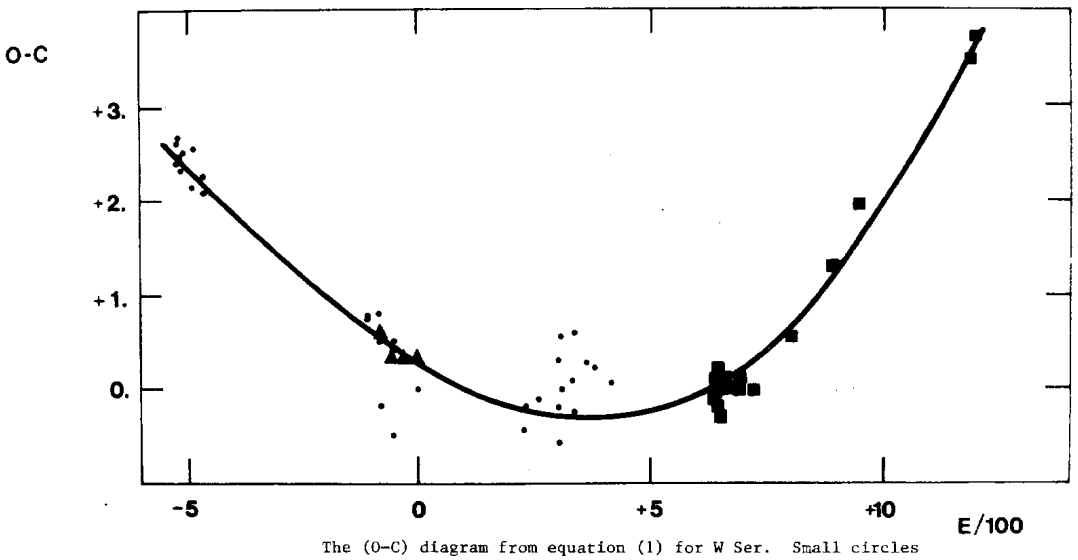
If the cubic term is ignored, the period change may be evaluated:

$$\Delta P = 0.54 \text{ sec/cycle},$$

$$\frac{\Delta P}{P} = 4.44 \times 10^{-7}.$$

This period change is comparable to the recent ones for β Lyr (Herczeg 1973) and RX Cas (Kreiner 1978).

It may be noted that the present phases of the (O-C)-diagrams for W Ser and RX Cas appear to be similar to each other. In another communication, Plavec and Koch (1978) remark upon the similarity of the satellite UV



The (O-C) diagram from equation (1) for W Ser. Small circles refer to visual or photographic estimates, triangles refer to visual observations, and squares refer to photoelectric measures. The curve represents equation (2).

spectra of these two systems. It will be interesting to see if their respective period changes can be correlated in any way with the richness of the emission spectra and, by inference, with the vigor of the presumed mass transfer. Plavec and Koch also note that the emission spectrum of SX Cas is stronger than that for RX Cas and W Ser, and from Whitney's (1978) period study it is possible to infer that SX Cas is at a phase in its period variation different from that of the two other systems.

An approximation to a linear ephemeris after E = + 715 (from (1) and (2)) may be suggested:

$$\text{Pr. Min.} = 2436748.10 + 14.16540E' . \qquad (3)$$

R. H. KOCH
Department of Astronomy
University of Pennsylvania
Philadelphia, PA 19104

E. F. GUINAN
Department of Astronomy
Villanova University
Villanova, PA 19085

and

Biruni Observatory
Pahlavi University
Shiraz, Iran

References:

Banachiewicz, T. 1928a, S.A.C. 6, 66
Banachiewicz, T. 1928b, S.A.C. 6, 69
Bauer, C.A. 1945, Ap.J. 101, 208
Fresa, A. 1957, A.J. 62, 362
Fresa, A. 1962, M.S.A.I. 33, 151
Filin, A.Ya. 1948, Perem. Zvezdy 7, 90
Gaposchkin, S. 1937, H.A. 105, 511
Hall, R.C. 1967, A.J. 72, 778
Herczeg, T.J. 1973, I.B.V.S. No. 820
Kreiner, J.M. 1978, I.B.V.S. No. 1403
Kruszewski, A. 1972, A.A. 22, 405
Lause, F. 1930, A.A.c 1, 98
Lynds, C.R. 1957, Ap.J. 126, 81
McLaughlin, D.B. 1961, A.J. 66, 351
O'Connell, D.J.K. 1937, Ann. Bosscha Lembang 8, 22
Plavec, M. and Koch, R.H. 1978, I.B.V.S. No. 1482
Tsesevich, V.P. 1955, Odessa Izv. 4, 6
Walraven, J.H. 1969, I.B.So.Hem. 15, 40
Whitney, B.S. 1978, I.B.V.S. No. 1430
Wood, D.B. and Forbes, J.E. 1963, A.J. 68, 257
Zacharov, G.P. 1954, Perem. Zvezdy 10, 48
Zinner, E. 1912, A.N. 190, 377
Zinner, E. 1922, A.A.A.N. 4 (3), C1