LONG TERM PERIOD BEHAVIOUR OF CONTACT BINARIES

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ABSTRACT. Determination of the rate of mass flow in contact binary systems is one of the most important motives for their observation. Many of these binaries are in over-contact configuration with a common equipotential surface located somewhwere between the inner and outer Lagrangian zero-velocity surfaces. Most are active systems displaying frequent lightcurve and period changes resulting in residuals behaviour depictable by intersecting linear segments.
Period changes are predominantly caused by mass loss or mass transfer. Period behaviour is frequently complicated by rotation of the line of apsides (resulting in out-of-phase periodic variations of minima) or orbital motion about a third component (resulting in periodic phase variations). Residuals diagrams have to be rectified for apsidal motion and lighttime effect.

Twenty four contact binaries have been under observation during a nine-year period. For sixteen of these, sufficient data relating to period changes, have been accumulated to enable plotting of residuals versus Heliocentric Julian dates as (O-C) diagrams. Such diagrams reveal that the long term period behaviour of most of these systems is of similar if not identical nature.

Decreases in period range from $\overset{d}{.05}$-$\overset{d}{.55} \times 10^{-5}$. This range is likely to reflect different stages of binary evolution in terms of mass ratio and degree of contact. A plot of period changes versus mass ratios confirms that period changes range between the above values which correspond to mass ratios between .4 and .9.

This clustering must be partly contributable to observational selection. Considering however, the range in colour and period of the systems selected, there appears to exist a relationship between the period changes, δP (in d x 10^{-5}) and the mass ratios, q, of the components in the form: $\delta P = 0.48 - 0.47q \pm 1.3 \cdot 10^{-5}$). A number of period change values appears to fall outside the region covered by the above equation. Most likely this is attributable to surface activity (starspots).

A full paper on the above topic is in preparation and will be published in 1986.

J. B. Hearnshaw and P. L. Cottrell (eds.), Instrumentation and Research Programmes for Small Telescopes, 295.