NEW RESULTS ABOUT POST OPTICAL MAXIMUM OSCILLATIONS OF NOVAE

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Abstract. New results presented include the oscillations of intervals between maxima of light oscillations, while in the case of GK Per the Orion system velocities oscillated with twice the light oscillation period.

The light curves of novae often show oscillations whose nature is not understood, after optical maximum. For instance DK Lac had what appeared to be secondary outbursts, while V603 Aql and GK Per showed transition stage pulsations. If graphs of continuum magnitude are plotted against log time from optical maximum, the last two of these novae showed an early decline along a straight line, late decline along a lower parallel line, and oscillations with maxima and minima tending to lie on each of these lines (Friedjung 1966a). We have now further investigated such phenomena.

In figs. 1 and 2 the oscillations of two novae are shown. The lowest section of fig. 1 shows the light curve of DK Lac, the positions of maxima being indicated just above. The middle section of this figure shows that the intervals between the maxima of this nova oscillated, while the upper section shows the increase of the intervals between the maxima of the oscillations of the oscillations. In fig. 2 the upper section shows the light curve of GK Per, the positions of minima being indicated just below. The bottom section shows the oscillations of the intervals between successive maxima. Other novae also show such oscillations of oscillations.

Another unexpected feature is shown in the middle section of fig. 2 and in fig. 3. Up to now a correlation has generally been observed between the brightness of a nova and the Orion absorption system velocity, particularly when there are oscillations. Friedjung (1966b) expressed this as a relation between velocity and photospheric radius, but this did not work for GK Per. The middle section of fig 2 shows the velocity oscillations of GK Per, which seem to have twice the period of the light oscillations and about half the period of the oscillations of oscillations. Defining a phase $\phi = (t\text{-}t_1)/(t\text{-}t_3)$, with t the time of a velocity measurement, t_1 that of the preceding selected optical maximum, and t_3 two maxima later, fig. 3 shows the variation of velocity with ϕ counting maxima in two different ways. Both parts of fig. 3 show the velocity variation with twice the period.

The interpretation of these effects is uncertain. They are not easy to understand in the framework of stellar pulsations, especially as the photosphere seen for some time after optical maximum is almost certainly produced by a supersonic optically thick wind. A study of the properties of the expanded white dwarf component of the binary has however started.

References : Friedjung, M. 1966a, Mon. Not. R. Astr. Soc. 131, 447.
Friedjung, M. 1966b, Mon. Not. R. Astr. Soc. 132, 317.

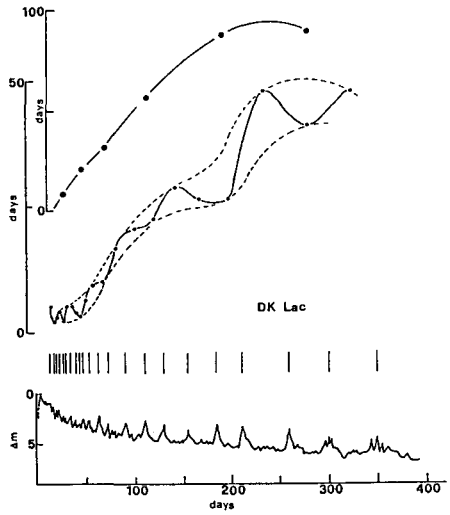

Figure 1

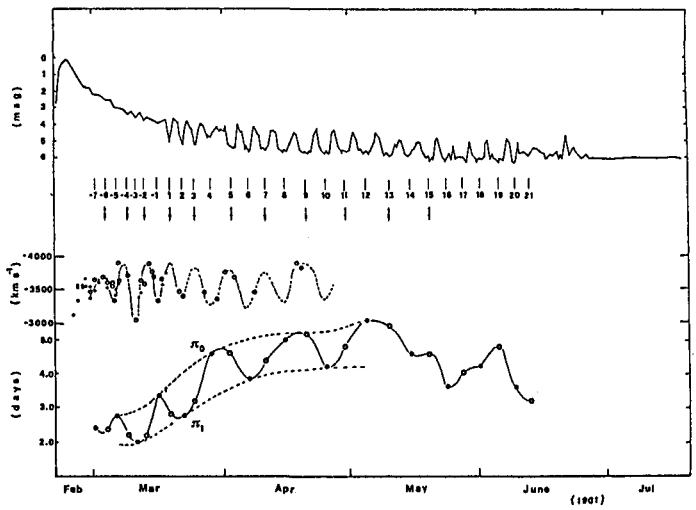

Figure 2

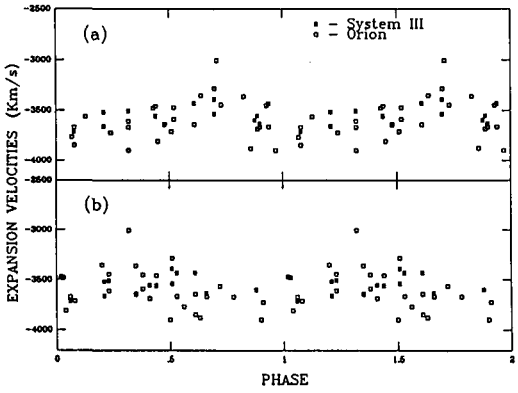

Figure 3

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