

KX ANDROMEDAE: POSSIBLY A STRONGLY INTERACTING BINARY

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Although KX And (HD 218393, MWC 397) has been observed since the beginning of our century, we have no reliable model of this peculiar emission-line object. Published papers (e.g. Plavec *et al.* 1982; Kriz and Harmanec 1975 and references therein) indicate that it is a B+K W Ser-type binary with a period of 38.9 days. This paper presents a summary of intensive observations carried out during the last fifteen years.

The observational material used consists of 65 coude spectra obtained with the Ondrejov 2-m telescope, UBV photometry obtained at Hvar Observatory and 28 archival IUE images. The radial-velocity and photometric data are combined with those found in the literature. A PDM period search over the interval 1 to 1000 days unambiguously indicates the 38.9-day period both in RV and photometric data. A formal orbital solution for all the optical metallic RV's leads to the following linear ephemeris for the epochs of maximum velocity:

$$T_{\max RV} = \text{JD } 2423219.478 + 38.918 \times E$$

Radial velocity curves of the optical metallic lines and UV subordinate metallic shell-lines show two maxima (at phases $0P0$ and $0P35$ and two minima (at phases $0P20$ and $0P65$). In contrast, the radial-velocity curve of He I lines is essentially sinusoidal with a maximum at phase $0P0$, and is at the same time blue-shifted with respect to the others, the mean velocity being -100 km s^{-1} .

Phase-dependent line-profile variations are described and it is concluded that there is a circumstellar contribution to the He I lines as well. The UV subordinate metallic lines persist intensively throughout the whole cycle and mimic the spectrum of an A2 supergiant. The strong resonance lines with P Cyg profiles dominate the UV region. No clearly photospheric line was found in the whole spectrum of the star.

Photometric light minima exactly coincide with phase zero of the velocity maxima. The amplitude of light variations is about 0^m1 in \bar{v} and increases towards shorter wavelength, being as large as 0^m6 in \bar{v} on some cycles but only 0^m2 on some others. The colour variations are

parallel to the light variations and more pronounced in $\underline{U-B}$ than in $\underline{B-V}$. The object becomes redder in both indices during the photometric minima. According to the position in the $\underline{U-B}$ versus $\underline{B-V}$ diagram KX And is a strongly reddened object. Observed energy distribution in UV region is similar to that of a B7V star. The largest time variations and deviations from the expected continuum occur in the regions of strong shell line blends, mainly Fe II.

The observed variations can be understood in the framework of an interacting binary model. The main RV maximum could be identified with the projection of a gas stream (from the unseen secondary) against the stellar disk of the primary at appropriate orbital phases. The eclipses of the primary by this stream or by a part of the anisotropic accretion disk around the primary component are responsible for primary photometric minima. The variations in the colour-colour diagram could be interpreted as an indication of the anisotropic distribution of circumstellar matter in the system. Probably we are dealing with a strongly interacting binary seen in the phase of rapid mass-transfer. We do not see the primary star, but only various components of the circumstellar structure in which it is completely hidden.

REFERENCES

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