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Spectroscopic orbits of HR 3009 and HR 3335

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Abstract. New spectroscopic orbital elements of two short period double-lined spectroscopic eclipsing binaries HR 3009 and HR 3335 are presented.

Key words: spectroscopic eclipsing binaries elements

1. Introduction

(a) HR 3009 was found to be a late A-type double-lined spectroscopic binary with nearly equal components, diffuse lines and large velocity amplitudes (Andersen & Nordstrom 1977). Later Reipurth (1977) found it to be a detached eclipsing binary with small orbital eccentricity It is the fainter component of the double star ADS 6348, (Struve 1938) with a separation of 17 arcsec and is also known as 2 Pup B

Spectroscopic and photometric study of this system was made by Vaz & Andersen (1984); they report that these results for e and ω and for the luminosity ratio are in good agreement, and also that the two components are identical in mass. They further state that inspite of some intrinsic light variability, the *uvby* light curves yield well-determined photometric elements which indicate that the stars have the same effective temperature and almost equal radii of 1 5 $R_{\odot}$.

(b) HR 3335 was first detected to be a variable (BV 634) of unspecified type by Strohmeier *et al.* (1965), using sky patrol plates. Later Andersen & Nordstrom (1977) found it to be a double-lined spectroscopic binary with nearly equal components, not very diffuse lines and large velocity amplitudes Subsequently, Olsen (1977) confirmed it to be a detached early A-type eclipsing binary with deep narrow minima. It is the brighter component of a close double star with a separation of 0.3 arcsec, $\Delta m = 1.1$ (Jeffers *et al.* 1963).

Photometric and spectroscopic observations of this system were made by Andersen, Clausen & Nordstrom (1984). This study shows the two components of the system to be similar in mass, radius, and temperature. According to them HR 3335 exhibits a slow apsidal motion, a significant part of this being relativistic in origin with a period of 3200 yr.

The basic data for these two stars are given in table 1.

2. Observations and results

The spectra for these two systems were obtained with the Meinel spectrograph at the Nasmyth focus of the 1.2m telescope of the Japal-Rangapur Observatory; the linear

reciprocal dispersion being about 33 A mm^{-1} around H_x. All the spectra were recorded on Kodak IIa-O emulsion. These spectra were measured on Gaertner's moving carriage comparator. The measured radial velocities will be published as contribution No. 26 from Nizamiah and Jabal-Rangapur observatories.

About 40 spectrograms were obtained for HR 3009 and 30 for HR 3335. The spectroscopic orbital elements were determined using the computer program of Wolfe *et al.* (1967). Tables 2 and 3 give these elements and figures 1 and 2 show the radial velocity curves. Our results compare well with those obtained by Vaz & Andersen (1984) and Andersen, Clausen & Nordstrom (1984) for HR 3009 and HR 3335 respectively.

Table 1. Basic data for HR 3009 and HR 3335

	HR 3009	HR 3335
HD No	62863	71581
α_{1950}	$07^h\ 43^m.2$	$08^h\ 25^m\ 3$
δ_{1950}	$-14°\ 34'.2$	$-20°\ 40'.7$
m_v	6.9	6 6
Sp type	AB V	Al V
Distance (pc)	83 ± 5	195 ± 10

Table 2. Spectroscopic orbital elements of HR 3009

P(d)	1 660728 (adopted)
T (HJD)	2446454 500 ± 0 045
K_A (km s^{-1})	126 9 ± 0.6
K_B/(km s^{-1})	129.9 ± 0.5
γ_A/(km s^{-1})	21 6 ± 0.6
γ_B/(km s^{-1})	29.5 ± 0.5
e_A	0 050 ± 0 005
e_B	0.031 ± 0.004
w_A	98 4 ± 9.7
w_B	280 1 ± 11.4
m_B/m_A	0 977 ± 0.008
$m_A \sin^3 i$ ($M_\odot$)	1.467 ± 0.018
$m_B \sin^3 i$ ($M_\odot$)	1 434 ± 0 015
$a_A \sin i$ (10^6 km)	2.90 ± 0 01
$a_B \sin i$ (10^6 km)	2.96 ± 0.01

Table 3. Spectroscopic orbital elements of HR 3335

P(d)	4 5961850 (adopted)
T (HJD)	2447194.770 ± 0.056
K_A (km s^{-1})	106.7 ± 0.5
K_B/(km s^{-1})	103.2 ± 1.2
γ_A/(km s^{-1})	2.5 ± 0.4
γ_B/(km s^{-1})	1.3 ± 0.9
e_A	0.082 ± 0.004
e_B	0.086 ± 0.001
w_A	109.3 ± 4.4
w_B	281.5 ± 12.3
m_B/m_A	1.033 ± 0.012
$m_A \sin^3 i$ ($M_\odot$)	2.088 ± 0.036
$m_B \sin^3 i$ ($M_\odot$)	2.185 ± 0.090
$a_A \sin i$ (10^6 km)	6.72 ± 0.03
$a_B \sin i$ (10^6 km)	6.50 ± 0.08

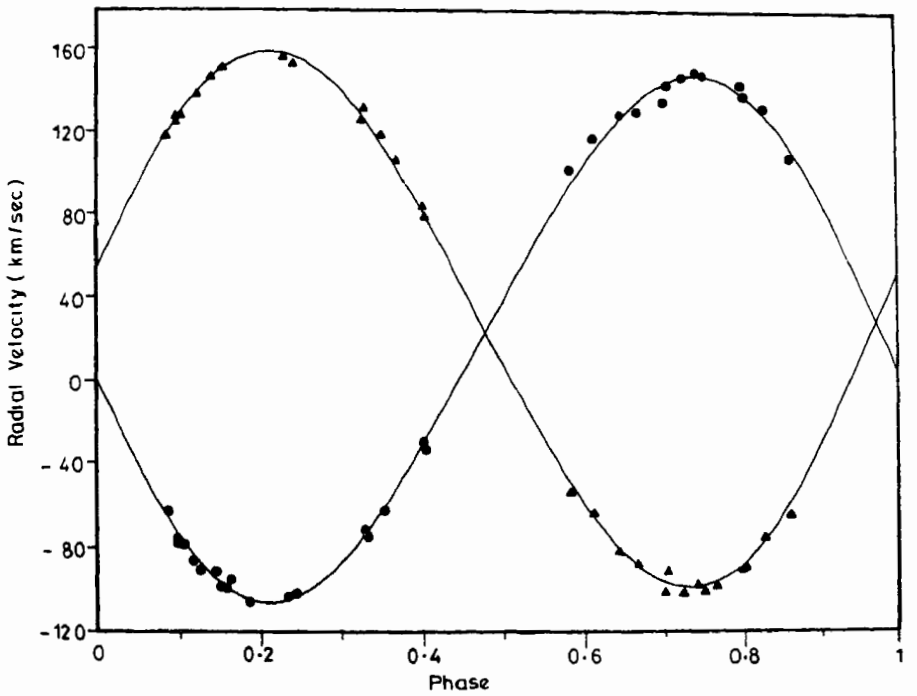

Figure 1. Radial velocity curve of HR 3009 The circles and triangles are the measured velocities for components A and B respectively

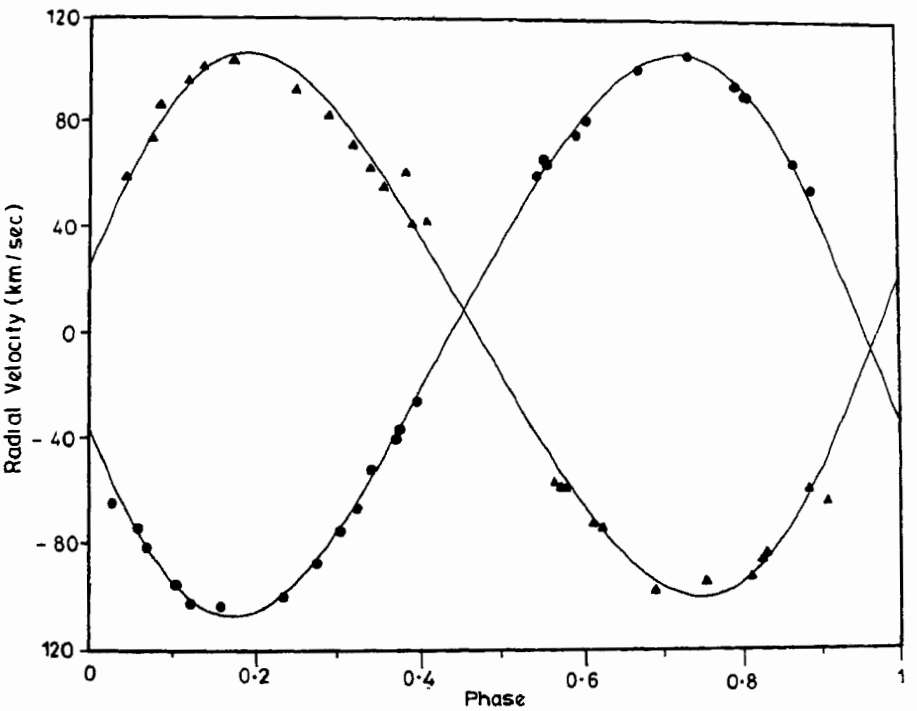

Figure 2. Radial velocity curve of HR 3335. The circles and triangles are the measured velocities for components A and B respectively.

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