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NEW ECLIPSING BINARY SYSTEMS: HD 189735 AND HD 116274

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Observatory and telescope:	
M. Koppelman: Private Observatory, MN USA, 0.16m Newtonian astrograph; T. Droege: Private Observatory TASS TOM1, IL USA, dual 100-mm refractors	

Detector:	M. Koppelman: SBIG ST-7XE; T. Droege: Custom built dual CCD 442A
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Filter(s):	M. Koppelman: Johnson/Cousins VR_c ; T. Droege: Johnson/Cousins VI_c
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Transformed to a standard system:	No
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Availability of the data:	
Through IBVS Web-site as file 9999.txt	

Observed star(s):				
Star name	GCVS type	Coordinates (J2000)		Comp./check star(s)
		RA	Dec	
HD 189735	EB	20 01 11.915	+07 58 53.49	HD 189797, GSC 1071-1970
HD 116274	EW	13 22 44.826	-06 02 06.86	HD 116569, GSC 4965-1106

Ephemeris:				
Star name	E	2400000+	P [day]	Source
HD 189735		52458.847	0.78154	present paper
HD 116274		52772.717	0.60471	present paper

Remarks:

Variability of HD 189735 was identified by WS statistics (Welch and Stetson, 1993) in data acquired by the Amateur Sky Survey (TASS: Droege (2002) and Henden(2001)). HD 116274 was discovered in data acquired by Stardial (McCullough and Thakkar, 1997) with the procedure described in Wils (2003).

Extensive followup observations were performed to characterize the light curves, in R_c for HD 189735 and in V and R_c for HD 116274. TASS I_c data was not presented because it appears to have night-to-night zeropoint problems. Magnitudes were determined by ensemble solution using comp star magnitudes derived from Tycho-2 (Hog, 2000). We modeled the stars using the current Wilson-Devinney code (Wilson and Devinney, 1971). For HD 189735 we assumed a temperature for the primary of 9000K. Mass ratios in the range $0.2 < q < 0.4$ all gave equivalent results. The adjusted parameters are shown in Table 1. HD 116274 has an apparent total eclipse, which yields a highly accurate estimate of the mass ratio. The adjusted parameters for HD 116274 are shown in Table 2 and are based on an assumed temperature for the primary of 7200K. The light curves, WD fits and residuals are shown in Figures 1 and 2.

HD 189735 is best described as a short-period Algol binary system while HD 116274 is clearly a WUMa over contact eclipsing binary system. It is unclear whether the apparent increased scatter at the minima of HD 116274 is observational error or whether it reflects the actual behavior of the system. The 1-sigma of the comp star magnitudes was <0.02 for all data presented.

Table 1. Adjusted Parameters for Light Curve Solution for HD 189735

Parameter	Value	Std. Error
i	71°5	0°2
T_1	9000 K	(assumed)
T_2	5050 K	80 K
q	0.25	0.02
Ω_1	2.83	0.04
Ω_2	2.35	0.04
$L_1/(L_1 + L_2)_V$	0.96	0.01
$L_1/(L_1 + L_2)_R$	0.94	0.01
HJD_0	2452458.847	0.0011
P	0 ^d 78154	0 ^d 000002

Table 2. Adjusted Parameters for Light Curve Solution for HD 116274

Parameter	Value	Std. Error
i	82°7	0°6
T_1	7200 K	(assumed)
T_2	7300 K	80 K
q	0.235	0.002
Ω_1	2.289	0.004
Ω_2	2.283	0.004
$L_1/(L_1 + L_2)_V$	0.79	0.01
$L_1/(L_1 + L_2)_R$	0.79	0.01
HJD_0	2452772.717	0.0011
P	0 ^d 60471	0 ^d 00001

Acknowledgements:

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References:

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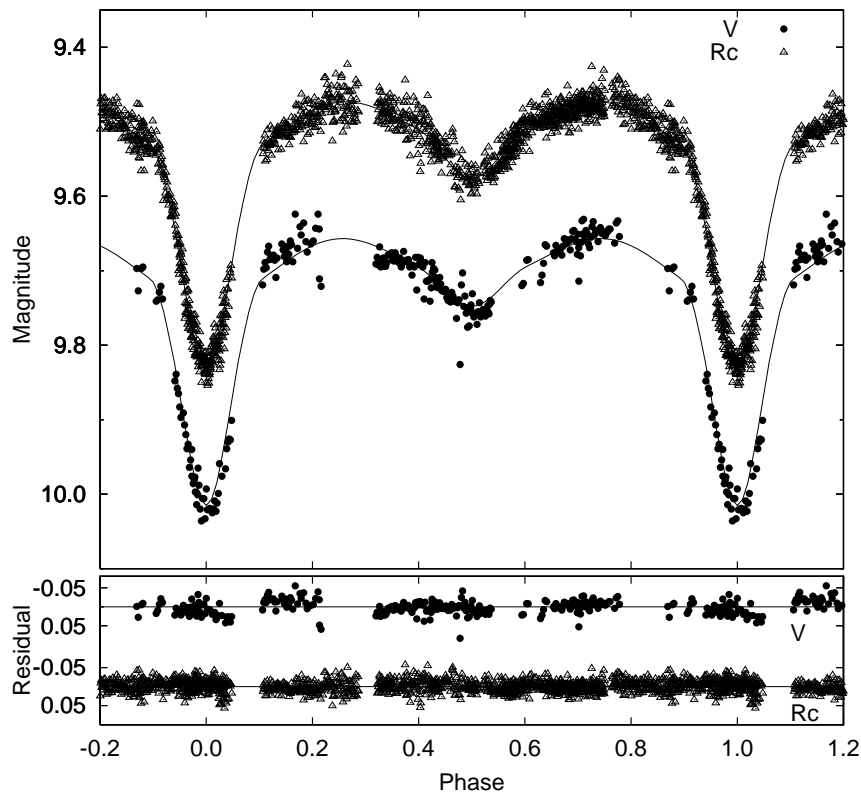


Figure 1. HD 189735. TASS V (filled circles) and Koppelman R_c (triangles)

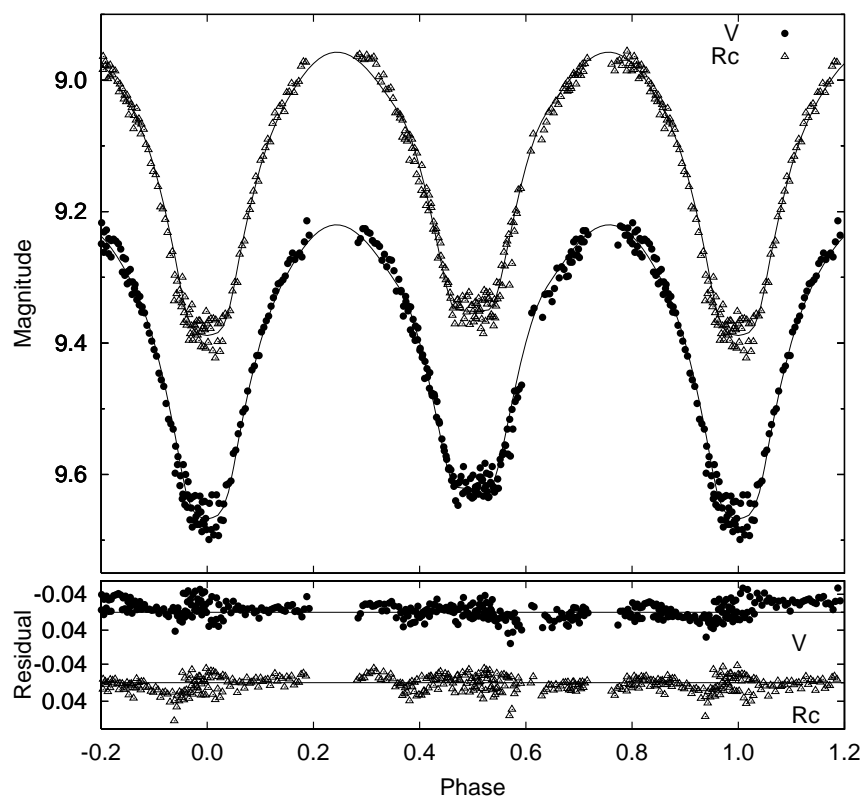


Figure 2. HD 116274. Koppelman V (triangles) and R_c (triangles)