Abstract:
TT Oph and UZ Oph are both classified in the GCVS as RV Tauri stars, pulsating variables with alternating deep and shallow minima. The literature indicates that the RV Tauri nature of these two stars is questionable. We have examined the AAVSO light curves for these objects for the eight year period of 2002-2010. We will present our analysis of the light curves and discuss how their recent behavior compares with past behavior as presented in the literature. Support for this work was provided by the NSF PAARE program to South Carolina State University under award AST-0750814.

Background:
RV Tauri (RV) and Semi-Regular (SR) variables are two related classes of pulsating variable stars. There may be a continuum of behavior between the groups and cross-identification may occur (Percy and Mohammed 2004). The tables below summarize the basic light curve properties of each group (Samus et al. 2009).

We are examining two stars TT Oph and UZ Oph that are classified as RV by the General Catalog of Variable Stars (GCVS) which may be SR stars. The main features that we are looking for will be the alternating deep and shallow minima caused by the two dominant periods in the light curve; the formal period (from one deep minima to the next) and the half period (from one minima to the next minima regardless of depth). For an RV star these two periods are typically near a 2:1 ratio. Figure 1 below shows an example of a synthetic idealized light curve expected for an RV star.

Analysis Methods:
We used two programs from American Association of Variable Star Observers (AAVSO) to aid our analysis: the Weighted Wavelet Z Analysis (WWZ) program and the Time Series Analysis (TS1.2) program. The WWZ program was used to identify the dominate periods in the light curves for each star and examine how those periods changed over time. The Fourier analysis tools within TS1.2 were used to refine the estimates of the dominate periods and then perform least squares fitting to the light curves using those periods. The light curves were examined on a year to year basis to look for the characteristic two periods, alternating minima, as well as irregularities and variations in the light curves.

AAVSO Data:
Our light curve data comes from the American Association of Variable Star Observers (AAVSO) for the time period from Jan 1, 2002 through Jun 1, 2010. This data range was chosen as it covered the time span for our existing spectroscopic database (see related posters 342.12 and 342.13). We included only Visual magnitudes and averaged the raw light curve data in four day bins. Typical error bars for AAVSO data points are in the range of 0.2-0.3 magnitudes and we estimate that the typical standard error of the mean for the averaged data is around 0.2 magnitudes.

Acknowledgements:
• Support for this work was provided by the NSF PAARE program to South Carolina State University under award AST-0750814.
• We acknowledge the assistance of Dr. Steve Howell, Dr. Don Walter, and Dr. Matthew Templeton for their assistance and advice concerning this research.

References:
• Gerasimovic, B. P., 1977BHarO.847...17G
• Horowitz, D. H., 1987JAVSO..16...71H
• Samus, N., et al. 2009yCat....102025S
• (Horowitz 1987) published light curve shows alternation of deep and shallow minima but irregularities in pattern. Fourier analysis indicates half period amplitude dominates
• (Percy and Mohammed 2004) self-correlation study shows great regularity but little evidence of alternating deep and shallow minima, RVa classification questioned
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