Amplitude of RR Lyrae Star Light Curves: Comparison between Observations and One–Zone Model Predictions

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Stellingwerf's one–zone model is a simple and useful tool for reproducing the main observed pulsational characteristics of RR Lyrae and high amplitude δScuti stars, in particular their light and color curves (Stellingwerf et al., 1987, *Ap.J.* **313**, L75; Antonello, 1990, *Astr. Ap.* **230**, 127). In the present poster we show in better detail a comparison of the observed *amplitudes* of the light curve at various wavelengths with those predicted by the one–zone model; a preliminary result on this subject was reported in the short note by Grieco and Antonello (1990, in *Confrontation between Stellar Pulsation and Evolution* p. 101). As in the previous applications, here we use the published grids of atmospheric models (Kurucz, 1979, *Ap.J.Suppl.* **40**, 1) and we do not consider possible shock effects.

The amplitudes predicted by the model as a function of wavelength are in good qualitative agreement with the spectrophotometric and photometric data of RR Lyrae stars available from the literature. The predicted amplitudes depend on the adopted equilibrium values of T_e, *log g* and on $[Fe/H]$. A high T_e gives a large amplitude mainly in the UV region, while a different *log g* gives a slightly different amplitude only in the blue–visual region. The amplitude in the UV region is particularly sensitive to $[Fe/H]$. Moreover, we find an interesting feature: at the wavelength corresponding to the CaII K line the amplitude appears to be independent on T_e, weakly dependent on the gravity and strongly dependent on $[Fe/H]$.

The model prediction of a sensitivity of the amplitude of the light curve at the various wavelengths to the parameters T_e, *log g* and $[Fe/H]$ is checked by means of a comparison with the observed data of some RR Lyrae stars (Liu and Janes, 1990, *Ap.J.* **354**, 273). The differences between the observed amplitudes in the bands U, B and V, that is $(\Delta U - \Delta V)$ and $(\Delta B - \Delta V)$, are computed and compared with the corresponding differences predicted by the model. The differences are plotted as a function of T_e, or *log g* or $[Fe/H]$. There is a qualitative agreement between the observed trends and the predicted ones. The are some small (0.05 mag) systematic differences between observations and models for $(\Delta B - \Delta V)$. The largest discrepancy is for the amplitude difference $(\Delta U - \Delta V)$, and this is tentatively interpreted as due to shock effects, which are expected to be larger in the U band than in the V band.

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