ANALYSIS OF THE MgII h SPECTRAL
LINE SHAPES IN HR7275 AND IM Peg

L. Č. POPOVIĆ, I. VINCE, S. JANKOV, G. DJURAŠEVIĆ,

O. ATANACKOVIĆ-VUKMANOVIĆ and D. JEVREMOVIĆ

Astronomical Observatory, Volgina 7, 11050 Belgrade, Yugoslavia

E–mail lpopovic@aob.aob.bg.ac.yu

Abstract. The analysis of high-resolution IUE spectra of the RS CVn type stars HR 7275 and IM Peg is presented. The inverse method technique was applied to the MgII h chromospheric emission line, that shows the presence of interstellar absorption, in order to recover the intrinsic stellar line profile parameters.

1. INTRODUCTION

The RS CVn type stars are chromospherically active stars consisting of a binary, one of whose components is a G-K sub-giant or giant. This component shows strong MgII k and h emission. It is established that the variations in the optical light curves of the RS CVn variables can be interpreted in terms of cool surface spots analogous to sunspots, but covering a large fraction of the RS CVn active component (Jankov, 1992). Associated with the modulation of optical light are variations in the strengths of chromospheric and transition region lines, which are generally in antiphase with the optical light curve (Rodono *et al.* 1986, 1987). So, the chromospheric MgII h spectral line shape reconstruction is very important for diagnostics of this region.

2. DATA AND ANALYSES

In this paper an inverse technique method, described by Vince *et al.* (1995), was used to reconstruct the MgII h spectral line shapes of HR 7275 and IM Peg stars from UV spectra observed by IUE.

2.1. THE HR 7275 STAR

It is known from the catalogue of chromospherically active binary stars (Strassmeier *et al.*, 1988) that the HR 7275 (HD 179094) star ($m_v = 5.8$) is a member of the RS CVn class with K1IV-III spectral type. It is an object with X-ray and chromospheric emission in CaII H & K (class B) and MgII h & k, and H_α filled-in absorption. Radio emission was not detected. The star possesses a moderate projected rotational velocity $v \sin i = 15$ km/s.

I1=12.148, d1=−0.3318 A, w1=0.651 A
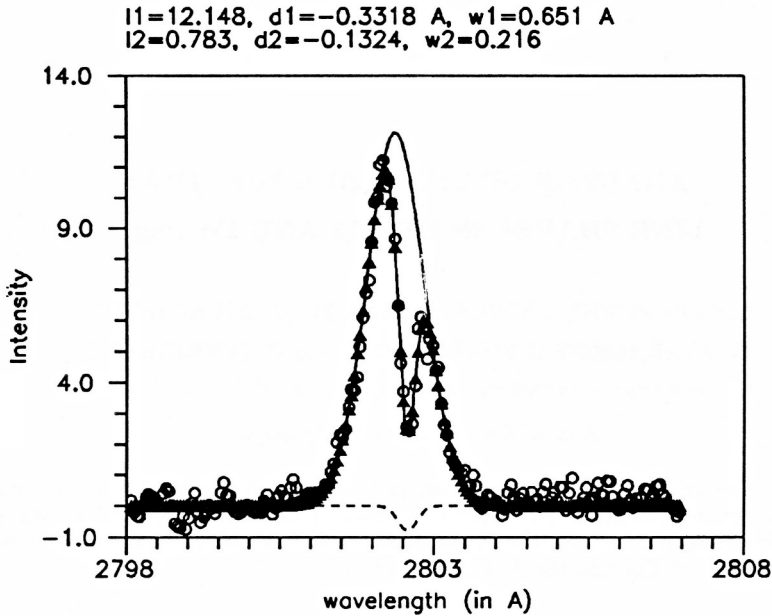I2=0.783, d2=−0.1324, w2=0.216

Fig. 1.   The observed (circles), the best fitted (full line with triangles), the reconstructed emission (full line) and absorption (dashed line) spectral line profiles. I_1 is the intensity, d_1 is the shift and w_1 is the width of the emission line profile; I_2, d_2, and w_2 are the same parameters for the absorption line profile; exp. time=23 min

The two high-dispersion long wavelength IUE spectra were obtained with the LWR camera (image number LWR 10317, exposure time : 23 min) on 9th April 1981 and with the LWP camera (image number LWP 13852, exposure time : 30 min) 15th August 1988.

The observed MgII h spectral line profiles show a prominent interstellar absorption component near the core of the emission line profile (Figs. 1 and 2.).

The reconstructed MgII h spectral line profiles with the best fit parameters are given in Figs. 1 and 2.

2. 2.   THE IM PEG STAR

The catalogue of chromospherically active binary stars (Strassmeier *et al.*, 1988) contains the following data on IM Peg (HD 216489). It is classified as a RS CVn K2III-II spectral type star ($m_v = 5.60$) with radio, X-ray and chromospheric emission in CaII H & K (class A) and MgII h & k, and H_α filled-in absorption. The star has an enhanced projected rotational velocity $v \sin i = 24$ km/s.

The two high-dispersion long wavelength IUE spectra were obtained with the LWR camera on 10th January 1981 (image number LWR 9680, exposure time : 15 min and image number LWR 9681, exposure time : 30 min).

The observed MgII h spectral line profiles show a prominent interstellar absorption component near the core (blue side) of the emission line profile (Figs. 3 and 4.).

I1=10.691, d1=−0.1698 A, w1=0.6754 A
I2=0.884, d2=0.04519 A, w2=0.18729 A
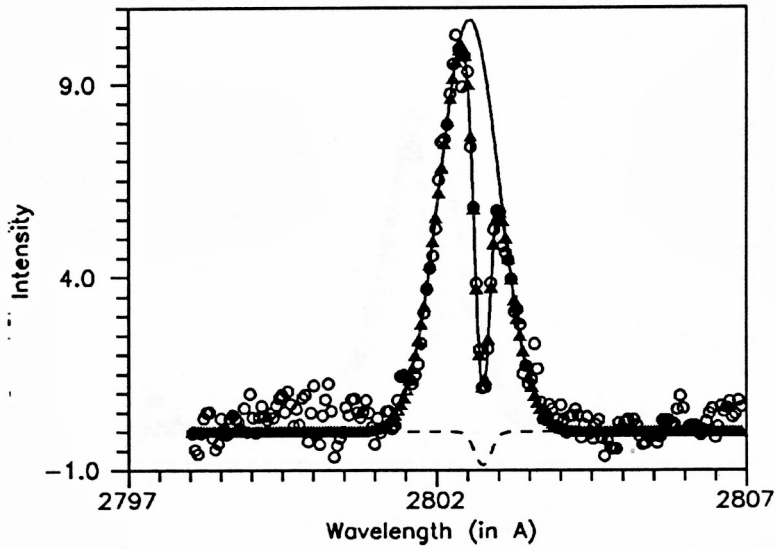

Fig. 2.   The same as in Fig. 1; exp. time= 30 min

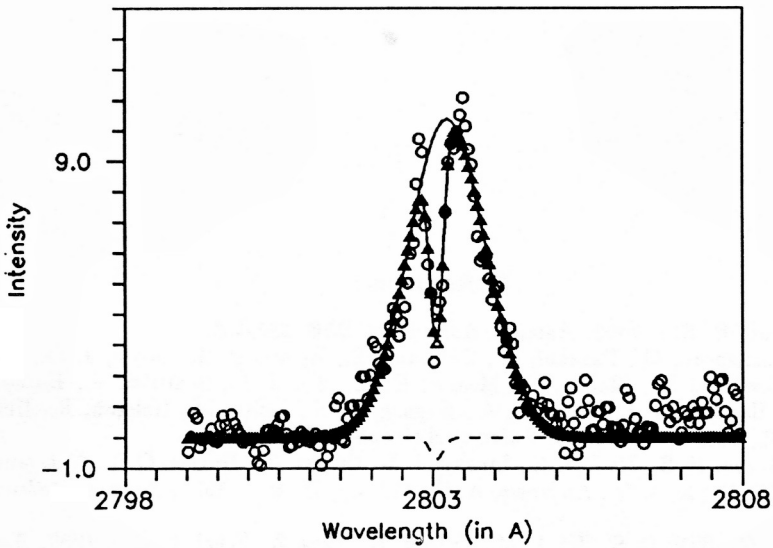I1=10.384, d1=0.5299 A, w1=0.8734 A
I2=0.6925, d2=0.356 A, w2=0.155 A

Fig. 3.   The same as in Fig. 1, but for IM Peg; exp. time= 15 min

l1=10.185, d1=0.4667 A, w1=0.866 A,
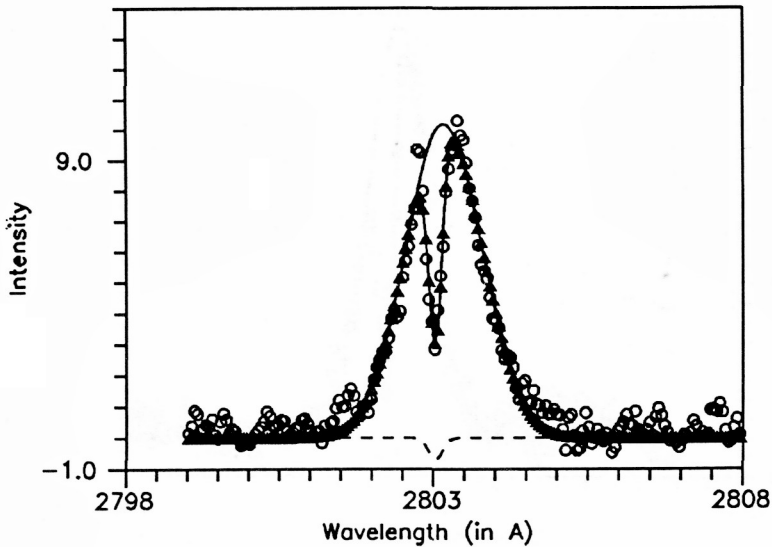l2=0.693, d2=0.324 A, w2=0.161 A

Fig. 4.   The same as in Fig. 1, but for IM Peg; exp. time=30 min

The reconstructed MgII h spectral line profiles with the best fit parameters are given in Figs. 3 and 4.

References

Jankov, S., Foing, B. H. : 1992, *Astron. Astrophys.* **256**, 533-550.

Rodonò, M., Cutispoto, G., Pazzani, V., Catalano, S., Byrne, P. B., Doyle, J. G., Butler, C. J., Andrews, A. D., Blanco, C., Marilli, E., Linsky, J. L., Scaltriti, F., Busso, M., Cellino, A., Hopkins, J. L., Okazaki, A., Hayashi, S. S., Zeilik, M., Helston, R., Henson, G., Smith, P., Simon, T. : 1986, *Astron. Astrophys.* **165**, 135.

Rodonò, M., Byrne, P. B., Neff, J. E., Linsky, J. L., Simon, T., Butler, C. J., Catalano, S., Cutispoto, G., Doyle, J. G., Andrews, A. D., Gibson, D. M. : 1987, *Astron. Astrophys.* **176**, 267.

Strassmeier, K. G., Hall, D. S., Zeilik, M., Nelson, E., Eker, Z., Fekel, F. C. : 1988, *Astron. Astrophys. Supplement* **72**, 291.

Vince I., Popović, L. Č., Jankov, S., Djurašević, G., Atanacković-Vukmanović, O., Jevremović, D. : 1995, *Publ. Astron. Obs. Belgrade* **50**, 21.