

## Referee report of the PhD thesis of Mgr. Pavel Chadima „A study of binary stars with accretion disks”

The PhD thesis of Mgr. Pavel Chadima is devoted to study of selected binary stars with accretion disks. Binary stars are one of the most important astrophysical objects, because they enable us a detailed test of stellar structure and evolution. On the other hand, a precise analysis of binary star data is a very complex and demanding task, consequently Pavel Chadima can be praised for the selection of the topic of his thesis.

The thesis can be divided in two parts. In the first part the problem of binary stars is introduced and own scientific work of the author is described. The second part contains original scientific papers of the thesis author. One of the papers deals with a detailed spectral analysis of  $\beta$  Lyrae, two of them study eclipsing binary  $\epsilon$  Aurigae and the last paper (which is a theoretical one) is devoted to the modelling of  $V/R$  variations of  $H\alpha$  emission coming from accretion disks in binaries. The papers published by Pavel Chadima contain new valuable scientific informations about individual stars and provide original models of  $V/R$  variations.

The thesis show that Pavel Chadima is able to obtain his own valuable scientific results. Anyway, I have some more specific comments and questions:

1. page 6: I do not think that  $\beta$  Lyr was the second variable star discovered (except supernovae). To my knowledge, also  $o$  Cet was discovered earlier.
2. page 6: „It is useful to note that during the first half of the 19<sup>th</sup> century...”. I think there should be 20<sup>th</sup> instead.
3. page 7: I do not understand why there should be overabundance of CNO due to CNO cycle.
4. page 234 of Ak et al. 2007, A&A: How was the continuum normalization done in the region of the Balmer jump? I think that this is not a simple problem and that a wrong continuum normalization can cause some artificial effects.
5. page 235 of Ak et al. 2007, A&A: Did you tested the possibility that  $\ddot{P}$  is nonzero?
6. page 239 of Ak et al. 2007, A&A: Is there any contribution of the disk to the  $H\alpha$  emission lines?
7. page 9 of Chadima et al. 2011, A&A: Would it be possible to derive the disk orbital velocity distribution from the  $H\alpha$  spectra?
8. page 10 of Chadima et al. 2011, A&A: Would it be possible to explain all observations ( $H\alpha$  variability and photometry) by a model in which the absorption is caused by the dust?
9. page 12 of Chadima et al. 2011, A&A: The fit of CIs on Fig. 14 is not very good. Would it be possible to improve it using a higher order term of Fourier series?
10. page 1 of Chadima et al. 2011, ApJ: The gravitational potential of the secondary is apparently neglected. Can this affect the derived results?
11. page 3 of Chadima et al. 2011, ApJ: Why do you assume  $\tilde{v}_\phi = \tilde{r}^{-3/2}$ . Is this correct?
12. page 3 of Chadima et al. 2011, ApJ: Would not be the blob density of  $\tilde{\rho} = 1$  too high? What would be its total mass in  $M_*$ ?

The thesis is well written. The author obtained valuable scientific results during his PhD study. The presented thesis fulfils the requirements for the PhD thesis and I recommend Mgr. Pavel Chadima to be awarded a PhD degree after a successful defense of the thesis.

doc. Mgr. Jiří Krtička, PhD.  
Brno August 6, 2011