D. Cohen
28Feb06

response to referee's second report (received 28Feb06) - MNRAS: MN-06-0094-MJ

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Reviewer's/Editor's Additional Comments:

On the question of whether the authors should add a note on their
choice of a beta=1 velocity law.  I think it is better if they do, so
they should go ahead.  Whether it is relegated to a footnote or is
inserted in the main text is a choice they have.
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This was the referee's original comment – and our response – on this topic:

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p.5 Concerning the assumption of a beta=1 wind law. This is the
assumption that was adopted in previous work on Zeta Pup (Kramer et al.
2003). Have you investigated how important an assumption this is -
does using beta=0.8 (or beta=2) make any substantial difference. My gut
feeling is that it is not a major issue (for a plausible range of
beta), but would appreciate some comments on this.
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This is a good point. We are, unfortunately, constrained by some practical issues. The optical depth integral requires numerical solutions for non-integer beta values - see Owocki and Cohen (2001). In that paper, we compare some beta=1 models to (rather extreme) beta=3 models - see Fig. 2. The qualitative differences in the profiles are not huge, even in those cases. If you look at Fig. 2.1 in Lamers and Cassinelli's book (see above), the beta=0.8 - which is the standard assumption/fit for O star winds - differs very little, in terms of simply the velocity profile, from the beta=1 case we assume here. The slightly more rapid acceleration of the beta=0.8 model would likely move Rmin inward, but just a very small bit (given the ~10% difference in the velocity in the two models near 1.5 Rstar) - and certainly less than the error on the derived model parameters.

In any case, the actual velocity law of the x-ray emitting plasma is not known (independently) and very well may be somewhat different from that of the bulk wind (although not likely too different - see the hydro simulation snapshots we reference elsewhere in the paper).

Perhaps we should add a note (a footnote?) to sec. 4, explaining why we use beta=1. We have not done this at this point, but would be open to doing so if the editor or referee recommended it.

Finally, we note that the new work by Puls et al. (2006), which we now discuss and reference in Sec. 5, shows beta values for their sample of O giants and supergiants that are even closer to unity than the standard value of 0.8 (see their Tables 8 and 9, for example).

(end quoted text)

So, we have added a footnote, which appears on p. 5, summarizing this information/justification regarding our choice of beta.

Also, we've made the following additional changes to the manuscript:

- Fullerton, Massa, and Prinja has now appeared. We've updated the bibliography accordingly.
- Two very minor – notational – changes to Figure captions (R_min to R_min/R_star in Fig. 5's caption; and switching the order of R_min and q in Fig. 6's caption.)