Dear Prof. Nemecek:

I have completed my review of the doctoral thesis, “Multiple Stellar Systems under Photometric and Astrometric Analysis” by Mgr. Petr Zasche, and I find it to be a quite reasonable effort. His combination of light-time effect analysis with consideration of astrometry of wider components appears to be quite useful; as a researcher working with only visual and interferometric binaries, I found the influence of these “wide” companions upon observations of close eclipsing pairs quite interesting to behold.

The information Mr. Zasche has gleaned regarding these systems will provide much useful material for the Washington Double Star database, as well as for the Washington Multiplicity Catalog, a database of information on all types of binary and multiple systems currently under development at the U.S. Naval Observatory. (It has already led me to a number of recent references previously unknown to me, including one containing discoveries of several new companions.) It appears, too, that his analysis can provide predicted separations and magnitude differences for possible undiscovered companions to other eclipsing pairs; these predictions will be most useful for planned duplicity surveys using speckle and long-baseline interferometry, as well as adaptive optics. Mr. Zasche has also highlighted numerous known visual and interferometric pairs which have been neglected in recent years and would benefit from further astrometric data in order to improve upon existing orbital analyses.

Mr. Zasche’s writing style is fine and his English excellent; I have sent him comments regarding spelling and grammatical issues, but all have been quite minor. I have also notified him of instances where additional information or references should have been cited or where his explanations were unclear. Again, I considered all of these to be fairly minor; they should be considered in preparing these materials for publication, but are not at all sufficient to be an issue regarding his qualifications for a doctorate.

If I may, I would like to suggest a few questions that might be asked Mr. Zasche during his thesis defense. None of them are particularly difficult, but it might be good for him to have considered at least some of these points:
1. He appears to rely almost solely upon Hipparcos as the source of parallax values for his objects. However, parallax determination for double and multiple systems is often more complicated than for single stars, due to the object's asymmetric shape (if marginally unresolved) or stray light from the nearby companion (if resolved) — both of which may change during the span of observations required for that parallax determination. (Note that this is not such a problem for "simple" close binaries without visual/interferometric companions.) How much of an effect would this parallax uncertainty have on any of his results?

2. Also, for those systems without Hipparcos parallax information, has he attempted to estimate distances through any other techniques — spectroscopic or orbital parallax, cluster distance, etc.? What other complications might be encountered in using these other techniques?

3. Regarding systems for which he can predict the approximate separation and magnitude difference of a possible companion, how many appear to be within the capabilities of speckle interferometry / multi-aperture interferometry / adaptive optics techniques? Does he plan any followup work, such as collaboration in attempts to resolve these objects? (I assume he plans to continue followup photometric observations.) What about followup work aimed at obtaining additional astrometric data for known companions in order to improve the astrometric orbital solutions?

4. Here's an odd question to toss out there: Again regarding those systems with predicted companions, is there any evidence in the Hipparcos parallax data — unusually large errors assigned to the final parallax values, for example — which might support these predictions?

As I noted above, I specialize in visual binaries, so do not feel qualified to judge his expertise in the photometric analysis of eclipsing pairs. However, his work with the astrometric portion of this analysis appeared to be fine. Should Mr. Zasche's committee feel he has successfully defended his thesis and recommend him for his doctorate, I would have no objection.

Sincerely,