

**Reviewer Report for the Habilitation Work:**  
*High Performance Computing in Ultrasound Cancer Treatment*  
by Ing. Jiří Jaroš, PhD.

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## **Overview**

This report considers first the Habilitation Thesis submitted by the candidate and second the research and pedagogic activities of the candidate, as evidenced in the application.

## **The Habilitation Thesis**

The thesis spans three interdisciplinary areas: high performance computing, applied physics and medicine. It involves collaborations over a period of six years involving researchers in the United Kingdom, Australia and the Czech Republic.

**Appropriateness and Up-to-date Nature of Topic.** The thesis addresses an important and a contemporary topic. Although it spans three interdisciplinary areas, the topic is coherent, with the aim of overcoming the diverse challenges of making ultrasound cancer treatment a clinical reality. The approaches employed in the three areas are state-of-the-art.

**Originality and Level of Contribution.** The thesis represents a new chapter in the research activities of the candidate, and is totally distinct from his doctoral thesis. While a number of other research teams are currently seeking to address the same aim, the approach taken in the thesis is original and the research described therein is one of the most advanced. The thesis presents the work of an international team, where the candidate's main contributions are in the high performance computing area. A large contribution in this respect is the development, release and maintenance of the k-wave toolbox, which is now widely used by other researchers. However, the candidate has also contributed significantly in the other areas.

**Level of Publication.** The core publications of the thesis are 14 in all: three papers in applied physics (modelling), six in high performance computing (simulation codes) and five in medicine (cancer treatment applications). All but one are in international venues; at least 10 are in journals or conferences which are clearly medium to high quality venues. The journals Medical Physics, IEEE Transactions on Biomedical Engineering, and International Journal of High Performance Computing Applications in particular are well-known as top-tier venues. Thus the core of the work has been published at a sufficient level.

**Formal Arrangement of Thesis.** The thesis is well-structured and is expressed coherently. The three contributing sections are concise but with sufficient detail for an expert in the respective area to follow.

## **The Candidate's Publication Record and Activities**

**Publication Breadth, Depth and Quality of Venue.** The candidate has evidenced some 45 publications in journals with an impact factor, book chapters and indexed conference papers. The research themes include those of the habilitation dissertation and a spectrum of other aspects of high performance computing, notably including communication on wormhole networks. While these are almost all joint publications, nearly half are first-authored by the candidate, and half of the others have a significant ( $\geq 20\%$ ) contribution by the candidate. This indicates a strong breadth and depth in quality published research undertaken by the candidate. As mentioned

above, at least three of the journals are regarded as top-tier. Taken together, the publication record indicates the candidate is highly accomplished in research.

**Recognition of Activities within the Community.** While there appear to be no recent external awards, the candidate evidences recognition with six academic and four industrial collaborations, all present or recent. There is a modest level of recognition in program or organization committee membership, which is mainly for workshops. There is a reasonable level of recognition evidence by reviewing assignments for journals with impact factors.

**Level of Pedagogic Activities.** The candidate has contributed significantly to the teaching of highly advanced courses in high performance computing for almost a decade. This is a high-level accomplishment. Three faculty awards from Brno over 2015-6 indicate this was carried out with distinction.

## Conclusion

In response to specific questions:

- *Is the topic appropriate to the particular area of habilitation and is it up-to-date from the viewpoint of the present level of knowledge?*

Yes, definitely.

- *Is the work original and does it mean a contribution to the area?* Yes, definitely and strongly so.

- *Has the core of the habilitation work been published at an appropriate level?* Yes, particularly for the journal publications.

- *Does the formal arrangement of the habilitation work show good didactic abilities of the candidate?* Yes.

- *Does the list of the candidates publications imply that he is a person with an outstanding research erudition?*

Yes, sufficient for the habilitation proceedings.

- *Have the candidates key works been published in renowned professional journals, and how many internationally?*

Yes.

*Do the candidates activities and work receive favourable mention and appreciation within the scientific community?*

Yes, although mainly from indirect indicators such as collaborations and service to conferences and journals.

- *Are the candidates pedagogical activities of an outstanding level?*

Yes, these are of sufficient level for the habilitation proceedings.

In conclusion, I regard the habilitation work and candidate achievements, as demonstrated in the application, as clearly meeting the requirements for the proceedings to associate professor.

Peter Strazdins, The Australian National University, 02/08/2017.