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Professor Jan Trlifaj
Vice-Dean
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Dear Professor Trlifaj:

The Habilitation Thesis of Dr. František Němec is a comprehensive overview of 30 research publications in peer-reviewed journals. In the Introduction the author provides a general overview of space plasma physics research and the nature and morphology of the Earth's magnetosphere and plasmasphere in the solar wind. He then introduces the topic of natural plasma waves that exist in this environment and the work he has been doing from 2004 to 2016.

In Chapter 2 the author discusses some of the spacecraft data that he has had the privilege to study. These include DEMETER, Cluster, and Van Allen Probes. The orbits vary considerably, as do the wave phenomena each observes. Each satellite has a unique suite of plasma wave receivers, frequency range, and antenna array, thus defining the range of observable wave phenomena and limits on the possible data analysis.

Chapter 3 discusses the topic of equatorial noise emissions observed by the Cluster suite of satellites. I am familiar with Cluster, especially the Wide Band Receiver on board the spacecraft. I am also familiar with the topic of equatorial noise, having formally reviewed one of Dr. Němec's papers for the [Journal of Geophysical Research]. I found the chapter informative and well-written, as I found the JGR article, originally. Dr. František writes well and explains the topic clearly and accurately. His contribution to the knowledge of magnetosonic waves, especially the fine structure, dispersion, as well as the possible source location and wave propagation has been significant, and has contributed to the continuing and ongoing study of the same waves observed by Van Allen Probes.

Chapter 4 considers the topic of quasiperiodic (QP) emissions. These unusual waves are probably whistler mode and show an unusual periodicity in their occurrence. The author discusses observational evidence from the Cluster, DEMETER, Van Allen Probes, and THEMIS satellites that the periodicity may result from unducted wave propagation from a generation region that is modulated by compressional ULF waves. This appears to be a very valid hypotheses. Similar waves also exist at Saturn and probably at Jupiter, and thus may have a similar source. Again, on this topic Dr. Němec provides a clear, in depth, description of his research displaying a high level of teaching expertise.

The topic of Chapter 5 is line radiation, which is whistler mode electromagnetic radiation from power lines. This emission occurs at base and harmonic frequency bands separated by 50/100 Hz or 60/120 Hz, as one might expect. I have little familiarity with these waves, but I found this

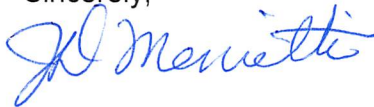
chapter quite informative, and well written. The author discusses two types of these emissions, the power line harmonic radiation (PLHR) which is generated by power lines and observed as weak emission by satellites. The other type is magnetospheric line radiation (MLR), which is usually more intense and has a different morphology than the PLHR. These waves may be stimulated by the PLHR and/or magnetospheric conditions.

Chapter 6 provided a short summary of concluding remarks, indicating the hopeful future of space physics plasma wave research, with, as usual, more questions being generated with each answer obtained. There is certainly a future for space physics plasma wave research based on the work of Dr. Němec and many others now pursuing these and related other topics both in Europe, Asia, the United States, and elsewhere.

ASSESSMENT AND RECOMMENDATION

I have known František for a number of years, having met him as a student of Professor Ondřej Santolík visiting the University of Iowa, USA. I have not only read very many of Dr. Němec's scientific papers in the journals, but I have also heard him speak at the scientific meetings and at the University of Iowa. I am impressed with the careful and comprehensive work he does and with his exceptional scientific insight. He is an excellent speaker, and teacher in the English language. Based on this knowledge, I believe Dr. Němec will make an excellent professor and researcher, and be in a position to compete well for available research funds. I have only praise for Dr. František Němec, and highly recommend him to be appointed as an associate professor in the Faculty of Mathematics at Charles University.

Sincerely,



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