MUNI

Annex No. 11 to the MU Directive on Habilitation Procedures and Professor Appointment Procedures

HABILITATION THESIS REVIEWER'S REPORT

Masaryk University	
Faculty	Faculty of science
Procedure field	Mathematics – Mathematical Analysis
Applicant	Mgr. Zuzana Pátíková, Ph.D.
Applicant's home unit, institution	Tomas Bata University in Zlin, Faculty of Applied Informatics
Habilitation thesis	Riccati methods for half-linear differential equations
Reviewer	Prof. RNDr. Jozef Džurina, CSc.
Reviewer's home unit, institution	Technical University in Kosice, Faculty of Electrical Engineering and Informatics

The habilitation thesis of Zuzana Pátíková is devoted to oscillatory and asymptotic properties of the second-order half-linear differential equations. It is a commented collection of 8 papers published by her jointly with co-authors. The author is interested mainly in the qualitative theory and asymptotic properties of conditionally oscillatory equations, focusing on the applicability of the so-called modified Riccati technique.

The scientific works of Z. Pátíková follows the results of prof. O. Došlý obtained in theory of half-linear differential equations. This theory is rich and deeply reworked. It is enriched with new results of plenty authors, which confirms recency of the subject.

The thesis consists of five chapters and includes offprints of 8 published papers. Chapter I presents the main methods and techniques used for examination of half-linear differential equations oriented to Riccati technique. Chapters II – IV contain the author's results – conditions for nonoscillatory solutions, oscillatory criteria and extension to neutral equations. Chapters V brings the numerical approach to finding approximate solutions of half-linear Euler-type equations, which makes use of the differential transformation method. In the end the thesis is concluded with a list of possible future directions of research.

I believe that selection of 8 paper is representative (papers are published in prestigious mathematical journals) and it characterizes the scientific activity of the candidate. Statistical data of publications (15 papers according to Web of Science) and citations (37 references according to Web of Science) confirm quality of her research works.

Reviewer's questions for the habilitation thesis defence

1. Is it possible to extend authors's results to higher (even) order differential equations? Eventualy, what difficulties it yields?

Conclusion

The habilitation thesis entitled " Riccati methods for half-linear differential equations " by Zuzana Pátíková **fulfils** requirements expected of a habilitation thesis in the field of Mathematics – Mathematical Analysis.

Date: February 16, 2022 Signature: