

<b>Masaryk University</b>	
<b>Faculty</b>	Faculty of Science
<b>Procedure field</b>	Mathematics - Mathematical Analysis
<b>Applicant</b>	Mgr. Zuzana Pátíková, Ph.D.
<b>Applicant's home unit, institution</b>	Tomas Bata University in Zlín
<b>Habilitation thesis</b>	Riccati methods for half-linear differential equations
<b><u>Board members</u></b>	
<b>Chair</b>	prof. RNDr. Zuzana Došlá, DSc. <i>Faculty of Science, Masaryk University</i>
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### **Evaluation of the applicant's scholarly/artistic qualifications**

Mgr. Zuzana Pátíková, Ph.D. received her Ph.D. in 2007 in Mathematical Analysis at the Faculty of Science of Masaryk University, with supervisor prof. Ondřej Došlý. Her professional experience includes the Assistant position (2004–2007) and the Assistant Professor position (since 2007) at the Faculty of Applied Informatics of Tomas Bata University in Zlín.

The research of Dr. Pátíková has focused on the asymptotic and oscillation theory of the second order half-linear differential equations and on their numerical analysis. Half-linear differential equations belong to the class of nonlinear differential equations, which are studied due to their particular properties by special methods. Sturm-Liouville type half-linear differential equations arise in the study of radially symmetric solutions of partial differential equations with p-Laplacian and thus they have wide applications, in particular in physics. The main scientific interest of Dr. Pátíková is the study of the conditional oscillation for half-linear differential equations of Euler type. Her main contributions include an extension of the modified Riccati technique, which is applicable e.g. to perturbed Euler type differential equations, and an application of the differential transformation method to half-linear differential equations with time-dependent delays. This approach enables to obtain numerical results for such equations, including a comparison with numerical computations.

She is the author or co-author of 19 original research articles, 12 of them are in journals in the WoS database (as of March 4, 2022), and 3 articles in refereed proceedings in WoS. The database MathSciNet contains 13 publications. She is a single author of 9 research articles, 7 of them are in the WoS database. Although her research is closely related with Brno school of differential equations – according to the investigated research topics – she succeeded in developing her own independent international response. She lectured on her results at several international conferences and workshops.

The papers of Dr. Pátíková have 37 citations on WoS (without self-citations), her h-index on WoS is 4. Her work is cited by 35 different authors from 12 countries in the world, including Japan, South Korea, Taiwan, India, Italy, and others.

She is also active in the field of Mathematical Education, where she collaborated as an investigator or a coordinator of 2 international projects (funded by the European Union and EEA Grants) and 4 national projects.

The Habilitation Committee states that Dr. Pátíková is a mature and independent scientific personality with high-quality scientific results, regular publications, and good international response.

**Conclusion:** The applicant's scholarly/artistic capabilities **meet** the requirements expected of applicants participating in a habilitation appointment procedure in the field of Mathematics - Mathematical Analysis.

### **Evaluation of the applicant's pedagogical experience**

The pedagogical qualification of Dr. Pátíková includes full-semester lectures and exercises on Mathematics I-III in the bachelor study program Engineering Informatics, and full-semester lectures and exercises on Mathematics I-II in another bachelor program at the Faculty of Applied Informatics of Tomas Bata University in Zlín.

She is the co-author of 1 textbook (published at Tomáš Baťa University in Zlín), 9 educational texts (2 of them were published by Masaryk University Press). She annually leads preparatory courses for the category B of Mathematical Olympiad (Gymnázium Zlín). She supervised 4 bachelor students.

As noted above, Dr. Pátíková was an investigator or a coordinator of 6 educational and development projects in Mathematical Education, in two cases these were international projects conducted in cooperation with Masaryk University and Brno University of Technology.

Dr. Pátíková is an excellent teacher, whose educational performance is appreciated by students. She demonstrated her pedagogical skills also during her habilitation lecture.

**Conclusion:** The applicant's pedagogical capabilities **meet** the requirements expected of applicants participating in a habilitation appointment procedure in the field of Mathematics - Mathematical Analysis.

#### **Habilitation thesis evaluation**

The habilitation thesis of Dr. Pátíková entitled "*The use of the modified Riccati technique in the qualitative theory of half-linear equations*" includes 8 original research papers supplemented by a common extensive introduction (52 pages). Most of the original papers have been published in the last few years, which shows that she has been very active in her research in recent years. The Habilitation Committee addressed three internationally recognized experts in the field of mathematical analysis as opponents. They are Naoto Yamaoka (Associate Professor, Osaka Prefecture University, Japan), Josef Džurina (Professor, University of Košice, Slovakia), and Petr Hasil (Associate Professor, Masaryk University, Brno). All opponents highly appreciated the scientific level and novelty of Dr. Pátíková's work and achieved results. One of the opponents also appreciated her skills in numerical analysis.

**Conclusion:** The applicant's habilitation thesis **meet** the requirements expected of habilitation theses in the field of Mathematics - Mathematical Analysis.

**Secret vote results**

Voting took place: electronically

Number of board members		5
Number of votes cast		5
of which	in favour	5
	against	0

**Board decision**

Based on the outcome of the secret vote and following an evaluation of the applicant's scholarly or artistic qualifications, pedagogical experience and habilitation thesis, the board hereby submits a proposal to the Scientific Board of the Faculty of Science of Masaryk University to **appoint the applicant associate professor** of Mathematics - Mathematical Analysis.

In Brno on 14.03.2022

prof. RNDr. Zuzana Došlá, DSc. ....