

Masaryk University

Faculty

Faculty of Science

Procedure field

Mathematics - Mathematical Analysis

Applicant

doc. RNDr. Michal Veselý, Ph.D.

Applicant's home unit, institution

Faculty of Science, Masaryk University

Board members

Chair

prof. RNDr. Roman Šimon Hilscher, DSc.

Faculty of Science, Masaryk University

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prof. Mgr. Pavel Řehák, Ph.D.

Institute of Mathematics, Faculty of Mechanical Engineering, Brno University of Technology

prof. RNDr. Jan Andres, DSc.

Department of mathematical analysis and applications of mathematics, Faculty of Science, Palacký University Olomouc

prof. RNDr. Michal Fečkan, DrSc.

Department of Mathematical Analysis and Numerical Mathematics, Faculty of Mathematics, Physics and Informatics, Comenius University Bratislava, Slovakia

Prof. Gennaro Infante, Ph.D.

Department of Mathematics and Computer Science, University of Calabria, Italy

Evaluation of the applicant's scholarly/artistic qualifications

Assoc. Prof. Michal Veselý received his Ph.D. in 2011 in the field Mathematics – Mathematical Analysis (Masaryk University), under the supervision of Prof. Ondřej Došlý, and he received the title Associate Professor (Doc.) in the field Mathematics – Mathematical Analysis (Masaryk University) in 2016. Since then he serves as an Associate Professor at the Department of Mathematics and Statistics, Faculty of Science, Masaryk University.

The primary area of scientific interest of Michal Veselý is given by almost periodic and limit periodic sequences and functions, in particular in their relation with differential and difference equations and systems. It is well-known that this research area has important applications in many physical sciences, such as in the celestial dynamics (astrodynamics), thermodynamics, wave problems (hydrodynamics), electrostatics, quasicrystals, and others. Michal Veselý introduced several new constructions of limit periodic and almost periodic functions and sequences with given properties. These constructions were used in theoretical research papers, as well as in applied research works concerning the velocity of a DC (direct current) motor device or the durability of metal-cutting tools. In addition, Michal Veselý used the constructions to obtain limit periodic, almost periodic and asymptotically almost periodic sequences and functions with given values in uniform spaces and such results were new also in the case of many particular intensively studied metric spaces. The famous monograph of A. M. Fink (*Almost Periodic Differential Equations*, Springer-Verlag, Berlin, 1974) contains formulations of main problems in the field of almost periodic equations. One of these open problems, regarding the existence of non-almost periodic solutions of a skew-symmetric almost periodic system, was fully solved by Michal Veselý in his two papers (2011 and 2012). To achieve most generality, Michal Veselý often considers in his works limit periodic and almost periodic homogeneous linear difference equations over infinite fields (with absolute values or more generally with metrics and pseudometrics). However, all main results of these papers are new even in the special cases of the fields of real or complex numbers. Together with Prof. Petr Hasil and other collaborators, Michal Veselý also established new techniques in the study of oscillation and non-oscillation for general differential and difference equations (and dynamic equations on time scales). They have identified the so-called critical oscillation constants for several types of linear and half-linear equations. In particular, they have found the critical oscillation constant for linear Euler type difference equations with periodic or asymptotically almost periodic coefficients. This open problem was formulated in 1959 and the corresponding continuous counterpart was solved only in the periodic case in 1998–1999. The results of Michal Veselý and his collaborators are optimal or non-improvable in the sense that the oscillation or non-oscillation of any considered equation is known with the exception of at most one multiple of the coefficients. They also proved various oscillation and nonoscillation criteria for perturbed differential equations. This research is applicable, for example, to the boundary value problems on the half-line with the p-Laplacian or to the elliptic partial differential equations. Further topics of the scientific interest of Michal Veselý include the spectral analysis and the numerical analysis.

As of October 14, 2024, the record of Michal Veselý as the author or co-author contains 54 original research articles in the MathSciNet database of the American Mathematical Society, as well as in the WoS database. His papers are published in high-ranking mathematical journals, like *Proceedings of the American Mathematical Society*, *Journal of Mathematical Analysis and Applications*, *Applied Mathematics Letters*, *Applied Mathematics and Computation*. It is remarkable that 30 of these publications, that is more than 50% of the total number, were created in the time period after his habilitation. This documents a strong publication drive of the applicant. The papers of Michal Veselý have 243 citations without self-citations according to WoS and this number is increasing (+32 citations since April 17, 2024, when the professor appointment procedure was initiated). Among those are 102 foreign citations from researchers from more than 20 countries, including Japan, China, Turkey, USA, Kazakhstan, France, India (+15 foreign citations since April 17, 2024). His WoS h-index is 18 and his Scopus h-index is 17.

Michal Veselý lectured on his results at many international conferences and workshops. He participated in several scientific stays abroad, namely at the Slovak Academy of Sciences in Bratislava, at the Comenius University in Bratislava, and at the University of Ulm. He collaborates with foreign researchers from Slovakia, Japan, Italy, and Austria. The quality of research and international recognition of the work of Michal Veselý is also documented by frequent invitations for reviews for recognized scientific journals, for example, for Journal of Mathematical Analysis and Applications, Archiv der Mathematik, Applied Mathematics Letters, Applied Mathematics and Computation, Nonlinear Analysis, Proceedings of the American Mathematical Society, Mathematische Nachrichten, Journal of Fixed Point Theory and Applications, Bulletin des Sciences Mathématiques, Topological Methods in Nonlinear Analysis, Open Mathematics, Journal of Difference Equations and Applications, and many others.

Michal Veselý was a supervisor of two Ph.D. students, namely Martin Chvátal (graduated in 2016) and Jakub Juránek (graduated 2021). Currently he is a supervisor of one Ph.D. student Ludmila Linhartová (since 2023).

Michal Veselý was a member of the research teams of four projects of the Czech Science Foundation during 2009–2022 and of one project of the Ministry of Education, Youth, and Sports of the Czech Republic within the operation programme Education for Competitiveness (2013–2015). He was also a member of the Organizing committee of the international conference EQUADIFF 15 held in Brno in 2022.

In 2006, Michal Veselý obtained dean's award prize for excellent results in his master studies and in 2009 he obtained dean's award prize for his excellent results and publications during his Ph.D. studies.

The Committee states that Michal Veselý is a mature 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 professor appointment procedure in the field of Mathematics - Mathematical Analysis.

Evaluation of the applicant's pedagogical experience

Assoc. Prof. Michal Veselý has long-term and extensive experience in teaching various mathematical courses. His pedagogical qualification includes full-semester lectures (as well as the corresponding seminar exercises) in the undergraduate and graduate level for students of mathematics, applied mathematics, economics, and informatics at the Faculty of Science and the Faculty of Informatics of Masaryk University. These courses include mathematical analysis, linear algebra, numerical methods, ordinary differential equations, partial differential equations, linear and nonlinear functional analysis, and mathematics of finance.

Michal Veselý supervised 24 bachelor students (3 more in progress), 9 master students, and (the above mentioned) 2 doctoral students, who successfully defended their theses.

Michal Veselý is an excellent teacher. His lectures are highly regarded by students and researchers both for precision and understanding. During the years 2014–2019 he was nominated five times for the rector's prize for excellent teachers, where he proceeded to a shortlist of candidates. He created textbooks for courses in mathematical analysis, ordinary differential equations, partial differential equations, functional analysis, and financial mathematics. Some of these textbooks are used as recommended study sources at other universities in the Czech Republic.

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

Evaluation of the applicant as a respected and recognized scholarly or artistic figure in a given field

Assoc. Prof. Michal Veselý is an exceptional personality both in research and teaching. He is a respected and internationally recognized researcher in the theory of almost periodic functions and sequences and oscillation of differential and difference equations. His original research achievements, worldwide citation response, and high teaching standards with exceptionally positive feedback from students document his leading position in forming the field of mathematical analysis. The evaluation committee has no doubt that he meets the conditions for being appointed as a full professor in Mathematics – Mathematical Analysis.

Conclusion: The applicant **is** a respected and recognized scholarly figure in his/her field. The applicant **has** made a significant contribution to the development of his/her field. The applicant **constitutes** a leading figure in his/her field of scholarship or research.

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 role as a respected and recognized scholarly or artistic figure, the board hereby submits a proposal to the Scientific Board of the Faculty of Science of Masaryk University to **appoint the applicant professor** of Mathematics - Mathematical Analysis.

In Brno on 18.10.2024

prof. RNDr. Roman Šimon Hilscher, DSc.

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