

Report of the Habilitation Committee for the promotion of
Michal Málek
to Docent in the area Mathematics – Mathematical Analysis

On October 2, 2012, the Scientific Council of the Mathematics Institute of the Silesian University in Opava approved the Habilitation Committee consisting of



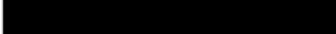
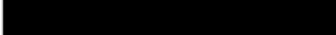
Prof. RNDr. Jaroslav Smítal, DrSc., Silesian University in Opava - chair
Prof. dr. Francisco Balibrea, University of Murcia, Spain
Prof. Dr. Peter Raith, University of Vienna, Austria
Prof. RNDr. Lubomír Snoha, DSc., DrSc, University of M. Bel, Banská Bystrica, Slovakia
Doc. RNDr. Marta Štefánková, Ph.D., Silesian University in Opava

The Committee was subsequently appointed as approved. The Committee observed that the proposal fulfills all the requirements as stated in § 72 of the Czech Republic Law no. 111/98 Sb. (the University Law), as well as all other conditions. The Committee recommended to continue the habilitation process and appointed the following referees for the evaluation of the habilitation thesis „Chaos and omega-limit sets in one-dimensional dynamical systems“:

Prof. dr. Victor Jiménez López, University of Murcia, Spain
Doc. RNDr Jozef Bobok, CSc., Czech Technical University, Prague
Doc. RNDr. Marta Štefánková, Ph.D., Silesian University in Opava

After receiving referees' reports the Committee assessed the qualifications of the applicant and issues the following report.

1. Personal data of the applicant

Michal Málek	Assistant Professor, Mathematics Institute, Silesian University in Opava
Born:	 1974
Czech ID no.:	
Address:	
Marital status:	
Educational history:	
1993 - 1998	Studies in Mathematical analysis (Mgr.), Faculty of Philosophy and Science, Silesian University in Opava
1998 - 2002	Doctoral study (Ph.D.) in Mathematical analysis, Mathematics Institute, Silesian University in Opava
1999	RNDr., Mathematics Institute, Silesian University in Opava
Employment history:	
2004 – present	Assistant Professor, Mathematics Institute, Silesian University in Opava
2008-2010	Postdoc position, Center for Mathematical Analysis, Geometry, and Dynamical Systems, Technical University of Lisbon

2. Pedagogical activity

Since 1998 M. Málek has been teaching a number of regular courses at the Mathematics Institute of the Silesian University, including Algebra, Applied statistics Mathematical analysis (basic and advanced courses), Theory of measure and integral, and several seminars. His pedagogical activities were regularly evaluated by students as very good.

3. Scholarly and research activities

The main field of research interests of Michal Málek are one-dimensional dynamical systems on the interval, topological graphs and dendrites, in particular, distributional and other types of chaos and the structure of omega-limit sets of such systems. He reported or lectured on his results at 18 international conferences in Czech Republic, France, Italy, Poland, Portugal, and Slovakia; he was an invited lecturer in France and Portugal.

4. Publications

Michal Málek has authored or coauthored 10 papers in international journals. Some of them are considered as prestigious ones, like *Discrete and Continuous Dynamical Systems*, *Ergodic Theory & Dynamical Systems*, or *Topology and its Applications*. His papers earned about 25 citations. There exist 5 so-called qualified citations, where the citing author uses the cited work in an essential way. The submitted habilitation thesis „Chaos and omega-limit sets in one-dimensional dynamical systems“ is a collection of 9 published papers equipped with an introduction; the coauthors of 4 of them confirmed in a written form that the applicant's contribution was significant and relevant.

[1] M. Málek, Distributional chaos for continuous mappings of the circle, *Annales Mathematicae Silesianae* vol 13 (1999), 205–210.

[2] M. Málek, Distributional chaos and spectral decomposition of dynamical systems on the circle, *Topology Appl.* 135 (2004), 215–229.

[3] R. Hric and M. Málek, Omega limit sets and distributional chaos on graphs, *Topology and its Applications* 153 (2006), 2469–2475.

[4] M. Málek, Distributional chaos in dimension one, *Grazer Math. Berichte* 351 (2007), 110–113.

[5] Z. Kočan V. Kurková and M. Málek, On the centre and the set of omega-limit points of continuous maps on dendrites, *Topology and its Applications* 156 (2009), 2923–2931.

[6] Z. Kočan, V. Kurková and M. Málek, Entropy, horseshoes and homoclinic trajectories on trees, graphs and dendrites, *Ergodic Theory and Dynamical Systems*, 31 (2011), 165–175, Erratum: pp 177–177.

[7] M. Málek and P. Oprocha, On variants of distributional chaos in dimension one, *Dynamical Systems*, 26 (2011), 273–285.

[8] Z. Kočan, V. Kurková and M. Málek, On the existence of maximal omega-limit sets for dendrite maps, *Communications in Nonlinear Science and Numerical Simulation* 17 (2012), 3169-3176.

[9] J.F. Alves and M. Málek, Zeta functions and topological entropy of periodic dynamical systems, *Discrete and Continuous Dynamical Systems – A*, 33 (2013), 465 – 482.

The referees' reports concerning the habilitation thesis are positive.

From the report of Prof. Jiménez López: „...Since the appearance (or rediscovery) in the seventies of some very influential papers by Sharkovsky and Li and Yorke, interval topological dynamics has garnered a lot of attention. Dynamics in more complicated one-dimensional spaces (trees, graphs, dendrites) has been investigated as well. It must be emphasized that this is not just generalization for the sake of it. While interval dynamics are pretty known by now, we are far from understanding discrete dynamics in dimension 2. Yet dendrites often appear as Julia sets in complex dynamics Thus, these more general one-dimensional spaces could be seen, in a sense, as a bridge between dimensions 1 and 2. The involvement of some very prestigious mathematicians in this particular field (Alseda, Blokh, Downarowicz, Franks, Llibre, Misiurewicz Snoha...) is a further proof of its relevance. In his habilitation thesis, Dr. Málek investigates some fundamental dynamical notions (mainly omega-limit sets and chaos) in this setting. ...

In short, the results in this thesis are new, interesting and non-trivial and, in the reviewer's opinion, accredit the expertise and skills of Dr. Málek on the subject. Thus I think that Dr. Málek satisfies the standard requirements for habilitation and recommend his promotion to the rank of „Docent“.

From the report of Doc. Bobok: „.... Celkově mohu konstatovat, že habilitační práce pana dr. Mála obsahuje zajímavé a netriviální výsledky z oblasti málorozměrných diskretních dynamických systémů. Doporučuji, aby byl dr. Málek na základě předložené práce po úspěšné habilitaci jmenován docentem.“

(*Translation:* „Overall I can state that the thesis of Dr. Málek contains interesting and nontrivial results from the area of low-dimensional discrete dynamical systems. I recommend that Dr Málek be promoted, upon successful defense, to the rank of Docent.“)

From the report of Doc. Štefánková: „... The thesis represents a good contribution in the field of discrete dynamical systems in dimension one. Papers creating the thesis have a good logical structure, the problems studied are interesting and valuable and the results are of good quality. The presented papers have been published mostly in international mathematical journals of very good scientific level.

Conclusions. Summarizing the above, it is a pleasure to recommend the habilitation thesis „Chaos and omega-limit sets in one-dimensional dynamical systems“ for acceptance and to promote RNDr. Michal Málek, Ph.D. to „docent“.

Conclusion

The Committee took into account the thesis, the referees' reports and all other documents characterizing the activities of the applicant. The Committee is convinced that Michal Málek fulfills all the requirements as stated in § 72 of the University Law as well as the conditions for promotion to the rank of docent in mathematical disciplines set by the Scientific Council of the Silesian University in Opava. Therefore

**the Committee unanimously recommends to promote
RNDr. Michal Málek, Ph.D.
to a Docent in the area of Mathematics – Mathematical Analysis.**

Opava, February 1, 2013

Prof. RNDr. Jaroslav Smítal, DrSc.



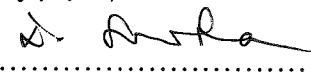
Prof. dr. Francisco Balibrea



Prof. Dr. Peter Raith



Prof. RNDr. Ľubomír Snoha, DSc., DrSc.



Doc. RNDr. Marta Štefánková, Ph.D

