

Report of the Evaluation Committee for the promotion of
Doc. RNDr. Marta Štefánková, Ph.D.
to full professorship in the area Mathematics - Mathematical Analysis

On 17 February 2011, the Scientific Council of the Mathematics Institute of the Silesian University in Opava approved the Evaluation Committee consisting of

Prof. RNDr. Ľubomír Snoha, DSc., DrSc., Matej Bel university, Banská Bystrica - chair
Prof. dr hab. Karol Baron, Silesian university, Katowice, Poland
Prof. RNDr. Zuzana Došlá, DSc., Masaryk university, Brno
Prof. RNDr. Miroslav Engliš, DrSc., Silesian university, Opava
Prof. dr. Víctor Jiménez López, Universidad de Murcia, Spain

The Committee was subsequently appointed as approved. The Committee observed that the proposal fulfills all the requirements as stated in § 74 of the Czech Republic Law no. 111/98 Sb. (the University Law), as well as all other conditions. The Committee assessed the qualifications of the applicant and issues the following report.

1. Personal data of the applicant

Marta Štefánková Docent, Mathematics Institute of the Silesian University in Opava

Maiden name: Babilonová

Born: 28. 1. 1974 in Třinec

Czech ID no.:

Address: 739 95, Bystřice nad Olší č. 302

Marital status: married, 3 children

Educational history:

1992 – 1997 Faculty of Philosophy and Natural Sciences, Silesian University in Opava –
M.Sc. in Mathematics and Physics for Teachers

1999 RNDr. (Doctor of Natural Sciences) in Mathematical Analysis, Mathematics
Institute of the Silesian University in Opava

1997 – 2000 graduate study of Mathematical Analysis, Mathematics Institute of the Silesian
University in Opava

2000 Ph.D. in Mathematical Analysis, Mathematics Institute of the Silesian University
in Opava

2003 habilitation (Docent) in the area Mathematics – Mathematical Analysis,
Mathematics Institute of the Silesian University in Opava

Employment history:

2000 – 2003 lecturer, Mathematics Institute of the Silesian University in Opava

2003 – present docent, Mathematics Institute of the Silesian University in Opava

2. Pedagogical activity

Since 1997, Marta Štefánková has been teaching a number of regular courses at the Silesian University, both at the basic and the advanced levels and in bachelor as well as master programs. Since 2008 she leads a seminar on discrete dynamical systems for graduate students and faculty of the Mathematics Institute. She is the chair of two committees for Bc. and M.Sc. final exams, and since 2010 she is the guarantor of the bachelor study program Mathematics.

She participates in educating the young scientific generation. She has been a supervisor of PhD theses since 2002. Among her students we find RNDr. Marek Lampart, Ph.D., for whom she was the supervisor of both his master thesis (which won the second prize in the Czech and Slovak

SVOC competition in mathematics in Prague) and his PhD thesis, which he defended in 2005. At present she is mentoring two graduate students, one of which (J. Dvořáková) expects to defend her thesis in 2011.

Marta Štefánková also gave numerous lectures during her stays at various institutions abroad (Unwersytet Śląski, Katowice, Poland; Karl-Franzens Universität, Graz, Austria; Universidad de Murcia, Spain).

3. Scholarly and research activities

In her 37 years Marta Štefánková is an internationally recognized scientist in the field of discrete dynamical systems. Her principal contribution are papers devoted to distributional chaos (which is a stronger version of the chaos discovered in the seventies by Li a Yorke). In 1994 Schweizer and Smítal introduced the notion of distributional chaos for continuous maps of the interval and proved that distributionally chaotic maps have some nice properties. Štefánková (Babilonová) was the first to publish results showing that already the triangular maps of the square fail to have most of these properties; the paper is from 1999. This led to two subsequent papers (from 2004 and 2005; coauthors Balibrea and Smítal) where two weaker forms of distributional chaos, DC2 a DC3, were introduced, which were more suitable for general topological dynamical systems, and their basic properties were established. These pioneering works were a source for follow-up by a number of other mathematicians. There are over 80 citations of these three papers, mostly by foreign authors; such rapid response is not usual in mathematical disciplines. It should be noted that now there are already hundreds of publications concerning distributional chaos, and that the notions of DC2 and DC3 are so common in the literature that many times they are used without references to the names of the authors (otherwise the number of citations would be much higher).

Various aspects of distributional chaos are the subject of five other papers by M.Štefánková, and one-dimensional dynamical systems are the subject of another four. There are no weak papers among them. In many cases they give solutions to problems formulated by other mathematicians. For instance, her paper from 1998 disproves a conjecture of the American authors Agronsky and Ceder, claiming that an arbitrary subcontinuum of a finite-dimensional Euclidean space is arcwise connected if and only if it is the omega-limit set containing the generating orbit. Another noteworthy paper is from 2008 (coauthored with P. Oprocha), in which functions with large distributionally scrambled sets are constructed. It is shown that in the case of a continuous map of a one-dimensional continuum such a set can even have a complement of zero Hausdorff dimension, which is, in some sense, the best possible result. This completes the effort of such prominent mathematicians like A. M. Bruckner or M. Misiurewicz, who were the first to construct (Li-Yorke) scrambled sets of full Lebesgue measure in the eighties.

Other results concern the theory of real functions and functional equations. A paper which must be highlighted here is the one from 2002, where a 50 years old problem concerning the characterization of the stationary sets for Jensen-convex functions was solved. The problem was recalled in a talk by the prominent scientist S. Marcus, and the solution was a rapid reaction. This clearly stimulated the interest of M. Štefánková in the field of functional equations. Jointly with L. Reich and J. Smítal she is the author of seven papers devoted to the generalized Dhombres functional equation. This is an equation of iterative type, whose solution is generally considered difficult both in the real and in the complex domain. Their cooperation resulted in number of theorems and techniques which doubtlessly will influence further research.

The scientific school of doc. Štefánková includes, in addition to M. Lampart mentioned above, also P. Oprocha (currently at Mathematics Institute of the Polish Academy of Sciences), whose research has been strongly influenced by her results.

A common mark of Marta Štefánková's papers is the fact that they address difficult problems, many times formulated by prominent mathematicians. She reported or lectured on her results at about thirty international conferences; 8 times she was an invited speaker with expenses covered by the organizers (2x Poland, 2x Spain, Germany, Japan, Portugal, USA). She received notable scientific awards, including the Prize of the Minister of Education of the Czech Republic for excellent students (2000), the prestigious Prize of the Learned Society of the Czech Republic for Junior Scientists (2008) and the L'Oréal Fellowship for Women in Science (joint program by UNESCO and national academies of sciences, 2009).

4. Publications

Marta Štefánková has authored or coauthored 18 papers in international journals, of which many are considered prestigious by the mathematical community (e.g. Proc. Amer. Math. Soc., Nonlinear Analysis, Topology and its Applications). Another 3 papers are submitted for publication. Her papers earned more than 120 citations, including 70 citations according to WoS (SCI) and 30 citations by domestic authors. There exist more than 20 so-called qualified citations, where the citing author uses the cited results in an essential way.

Conclusions

The Committee observes that the promotion of doc. Štefánková to full professorship was started in accordance with §74 of the Czech Republic Law no. 111/98 (the University Law) on the proposal of the director of the Mathematics Institute of the Silesian University in Opava. The candidate therefore need not submit any further recommendations. The Committee further observes that doc. Štefánková has gained international recognition for her scholarly work in the area of mathematical analysis. She has long been active as a university teacher in the Mathematics Institute of the Silesian University in Opava. She takes part in educating the young scientific generation. The Committee observes that doc. Štefánková fulfills all the requirements as stated in §74 of the University Law as well as the conditions for promotion to full professorship in mathematical disciplines set by the Scientific Council of the Silesian University in Opava. Therefore

**the Committee unanimously recommends to promote
doc. RNDr. Marta Štefánková, Ph.D.
to a Full Professor in the area Mathematics - Mathematical Analysis**

and presents this proposal to the Scientific Council of the Mathematics Institute in Opava for further proceedings.

Remark. This report was prepared in Czech and English versions, with identical contents.

Opava, May 10, 2011

Prof. RNDr. Lubomír Snoha, DSc., DrSc.

Prof. dr hab. Karol Baron

Prof. RNDr. Zuzana Došlá, DSc.

Prof. RNDr. Miroslav Engliš, DrSc.

Prof. dr. Víctor Jiménez López

L. Snoha
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K. Baron
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Z. Došlá
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M. Engliš
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signed: Víctor Jiménez López
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