

**Report of the Habilitation Committee for the promotion of  
RNDr. Jana Hantáková, Ph.D.  
to the rank of Docent in the area of Mathematics – Mathematical Analysis**

On March 3, 2022, the Scientific Council of the Mathematics Institute of the Silesian University in Opava approved the Habilitation Committee consisting of

Prof. RNDr. Lubomír Snoha, DSc., DrSc., Matej Bel University in B. Bystrica, Slovakia – chair  
Prof. Dr. Francisco Balibrea, Universidad de Murcia, Spain  
Prof. RNDr. Miroslav Engliš, DrSc., Silesian University in Opava  
Prof. Dr. Peter Raith, Universität Wien, Austria  
Doc. RNDr. Artur Sergeyev, DSc., Silesian University in Opava.

The Committee was subsequently appointed as approved. The Committee observed that the proposal fulfils all the requirements as stated in § 72 of the Czech Republic Law no. 111/98 Coll. (the Higher Education Act), 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 “On long-term behaviour of trajectories in discrete dynamical systems”:

Prof. Dr. Alexander Blokh (University of Alabama at Birmingham, U.S.A.)  
Prof. Dr. Víctor Jiménez López (Universidad de Murcia, Spain)  
Prof. Dr. Peter Raith (Universität Wien, Austria)

After receiving referee’s reports the Committee assessed the scientific and pedagogical qualifications of the applicant. The Committee issues the report below on the outcome of this assessment.

**1. Personal data of the applicant**

Name, surname: Jana Hantáková (née Doleželová)  
Affiliation: Mathematics Institute, Silesian University in Opava  
Born: [REDACTED] 1989  
Address: [REDACTED]  
Citizenship: Czech Republic

**Educational history:**

2008 – 2013	M.Sc. study of Mathematical Analysis, Silesian University in Opava
2013	Mgr. (M.Sc.) degree
2013	RNDr., Mathematics Institute of Silesian University in Opava
2013 – 2017	Doctoral study of Mathematical Analysis at the Silesian University in Opava (supervisor: Jaroslav Smítal)
2017	Ph.D. degree

**Awards:**

2013	The first prize in the Mathematical competition of students of Czech and Slovak Universities (SVOČ)
2017	Award from the Rector of the Silesian University in Opava
2022	Laureate of the Czech Mathematical Society Prize for Young Researchers (jointly with Samuel J. Roth) for a collection of papers in dynamical systems

#### Employment history:

2016 – 2017	Research Assistant, Mathematics Institute, Silesian University in Opava
2017 – 2018	Assistant Professor, Mathematics Institute of Silesian University in Opava
2018 – 2019	Maternity leave
2019 – present	Assistant Professor, Mathematics Institute of Silesian University in Opava
2020 – 2021	Junior Researcher (18 months), AGH University of Science and Technology, Kraków, Poland, research project “Limit sets in discrete dynamical systems” funded by Marie Skłodowska-Curie Actions – Individual Fellowships (EU programme Horizon 2020), under the supervision of professor Piotr Oprocha.

### 2. Pedagogical activity

Since 2013, J. Hantáková has been teaching a number of regular courses at the Mathematics Institute of the Silesian University in Opava, namely Topology, Ordinary differential equations, Dynamical systems I and II, Discrete dynamical systems, Continuous dynamical systems, Ordinary differential equations revisited. She has also been teaching a number of seminars and exercise sessions. Her pedagogical activities were regularly evaluated by students as very good.

She was a supervisor of one bachelor thesis and a reviewer for two bachelor theses.

### 3. Scholarly and research activities

Jana Hantáková is scientifically active in the field of discrete dynamical systems, especially in the topological and symbolic dynamics and in the chaos theory. Her results are mainly about distributional and Li-Yorke chaos and  $\alpha$ -limit sets. She gave talks on them on 11 international conferences in Czech republic 5x, Portugal 2x, Poland 2x, Bosnia and Herzegovina and Austria.

She spent 18 months at AGH Krakow, within a research project funded by EU (see above in the employment history). She also completed shorter research stays at Matej Bel University in Banská Bystrica and at University of Vienna.

She served as a referee for several international journals (Discrete and Continuous Dynamical Systems, Topology and its Applications, Fundamenta Mathematicae, International Journal of Bifurcation and Chaos).

### 4. Publications

Jana Hantáková authored or co-authored 10 papers in international journals, in particular in such prestigious journals as Ergodic Theory and Dynamical Systems or Nonlinearity. Her papers earned 22 citations (excluding self-citations of the author or co-authors). Among them there are 5 so-called qualified citations, when the citing author uses the cited work in an essential way. The submitted habilitation thesis “On long-term behaviour of trajectories in discrete dynamical systems” is a collection of 8 papers listed below, equipped with an 18-page introduction where the main results of the thesis are summarized.

- I. M. Foryś-Krawiec, J. Hantáková, P. Oprocha, On the structure of  $\alpha$ -limit sets of backward trajectories for graph maps, Discrete and Continuous Dynamical Systems 42 (2022), no. 3, 1435--1463.
- II. J. Hantáková, S. Roth, On backward attractors of interval maps, Nonlinearity 34 (2021), 7415-7445.

- III. J. Hantáková, Li-Yorke sensitivity does not imply Li-Yorke chaos, *Ergodic Theory and Dynamical Systems* 39 (2019), 3066-3074.
- IV. J. Doleželová, Distributionally scrambled invariant sets in a compact metric space, *Nonlinear Analysis* 79 (2013), 80- 84.
- V. J. Doleželová, Scrambled and distributionally scrambled n-tuples, *J. Difference Eq. Appl.* 20 (2014), 1169- 1177.
- VI. J. Doleželová-Hantáková, Distributional chaos and factors, *J. Difference Eq. Appl.* 22 (2016), 99-106.
- VII. J. Doleželová-Hantáková, S. Roth and Z. Roth, On the weakest version of distributional chaos, *Int. J. Bifur. Chaos* 26 (2016), 1650235, 13 pp.
- VIII. J. Hantáková, Iteration problem for distributional chaos, *Int. J. Bifur. Chaos* 27, no. 12, (2017), 1750183, 10 pp.

The co-authors of Jana Hantáková to the above joint papers confirmed that the contributions of all co-authors were equal.

All three referee reports on the habilitation thesis are positive.

*From the report of prof. Blokh:* "... Kolyada, Misiurewicz and Snoha who posed an interesting question concerning special  $\alpha$ -limit set conjecturing that these sets are closed. The author disproved this conjecture constructing a counterexample on the interval. In my view, this is a nice development that led to a publication in a major journal in the area ... .

All in all, this is a strong thesis, using various techniques and containing interesting results in several fields within dynamical systems theory. Therefore I recommend that Jana Hantáková be awarded the title of docent."

*From the report of prof. Jiménez:* "... I was favourably impressed by two things. On the one hand, five of the papers in the thesis are written by Dr. Hantáková alone, the other three in collaboration ... . This is, in my opinion, a very healthy publishing strategy, emphasizing both the scientific prowess of the candidate and her capability to fruitfully contact and work with other researchers. On the other hand, the problems investigated by the candidate are, quite often, very natural; which, of course, tends to imply that they are rather hard to solve.

All of the above accredits, in this reviewer's opinion, the expertise and skills of Dr. Hantáková on the subject. Consequently, I think that Dr. Jana Hantáková satisfies the standard requirements for habilitation and recommend her promotion to the rank of "Docent".

*From the report of prof. Raith:* "Jana Hantáková obtained many interesting and substantial results in the theory of low-dimensional dynamical systems. Hence I strongly recommend to award Jana Hantáková the title of "Docentka".

## 5. Scientific personality of the applicant

Jana Hantáková is an expert in the field of discrete dynamical systems and has already earned an international recognition. Based on her overall profile and existing pedagogical and scientific activity, the Committee is convinced that Dr. Hantáková fully satisfies the requirements typically laid on applicants for the degree of docent.


## Conclusion

The Committee took into account the thesis, the referees' reports and all other documents characterizing the activities of the applicant. The Committee concludes that Jana Hantáková fulfils all the requirements stipulated in § 72 of the Higher Education Act, as well as conditions for the 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. Jana Hantáková, Ph.D.,  
to the rank of Docent in the area of Mathematics - Mathematical analysis.**

Opava/Vienna, June 30, 2022

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

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Prof. Dr. Francisco Balibrea

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Prof. RNDr. Miroslav Engliš, DrSc.

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Prof. Dr. Peter Raith

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Doc. RNDr. Artur Serdyeyev, DSc.

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