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Koper, Slovenia, March 7, 2021

Referee report on the inauguration (Professor of Mathematics) of doc. RNDr. Róbert Jajcay, DrSc.

The Scientific Council of the Faculty of Mathematics, Physics and Informatics, Comenius University in Bratislava has appointed me to be a reviewer of the inauguration procedure of doc. RNDr. Róbert Jajcay, DrSc. Based on his application, I make the following assessment.

Scientific work

Dr. Jajcay's research field is combinatorics, more specifically, topological, extremal and algebraic graph theory.

Qualitative description. One of the central topics in the algebraic theory of graphs and maps is symmetry. For maps on oriented surfaces, the weakest level of symmetryis represented by vertex-transitivity and examples of such maps are Cayley maps. Their study started in the 70's, and since then these objects have become a well established research topic in topological graph theory. Regarding the scientific work of the applicant, I am most familiar with his contribution to Cayley maps, and in my opinion, Dr. Jajcay is one the leading experts of this field. In a series of papers, which he published in 2005 and 2007, the theory of Cayley maps was outlined, and these articles serve as standard references in the investigation of Cayley maps until today. In 2002, he published a fundamental paper, in which the concept of a skew morphism, an algebraic invariant that can be associated with each regular Cayley map, was introduced. The *method of skew morphisms* has become a powerful tool and boosted extensive research on regular Cayley maps worldwide. It turned out later that skew morphisms have wider applications based on their relation with complementary factorization of groups with a cyclic factor. About this connection he published an excellent paper in Journal of Algebra. Recently, skew morphisms have also attracted the attention of experts in abstract group theory, and I expect that interesting results will come out along this line of research as well.

The Cage problem is a well-known problem in extremal graph theory. Introducing symmetries in the problem led to remarkable results and the applicant is certainly the leading figure of this approach. This is best demonstrated by the high number of citations of his constantly updated *Dynamic cage survey*.

There has been significant interaction between abstract group theory and the theory graphs. Dr. Jajcay has solid contributed to this topic. His work concerns several families of graphs (non-Cayley vertex-transitive graphs, Praeger-Xu graphs, Johnson graphs, edge-transitive bicirculants, just to mention a few). Besides, he is also known for generalising know graph classes (e.g. Cayley graphs and generalised Petersen graphs).

Quantitative description. The publication list contains 64 items, almost all published in SCI journals, some in the most prestigious ones in combinatorics (J. Combin. Theory Ser. A and B, J. Algebraic Combin. and Combinatorica). The citation record is impressive. Dr. Jajcay has been collaborating with researchers from all over the world. He makes research visits regularly since 1999, and presented his research work as invited lecturer in several international workshops and conferences (China, Hungary, Mexico, Slovakia, Slovenia, UK, USA). He was invited lecturer at two of the most important meetings in topological graph theory: GEMS and SIGMAP. His activity as researcher is also evident from the research grants he has was awarded, and the scientific meetings by which he was one of the organisers. Dr. Jajcay is the member of the editorial board for Ars Mathematica Contemporanea and The Art of Discrete Mathematics, reviewer of Zentralblatt für Mathematik (77) and Mathematical Reviews (53) and a regular reviewer of many SCI journals.

Educational work

Dr. Jajcay has rich teaching experience. He gave lectures on various courses at several universities: Comenius University, Slovak Technical University, University of Nebraska Lincoln, Indiana State University and University of Primorska.

Dr. Jajcay has an impressive record as supervisor of BSc, MSc and PhD students. In terms of numbers, 7 BSc, 7 MSc and 3 PhD students in the last 6 years. All the PhD students are from different universities (Czech Republic, Slovakia and Slovenia). Besides, he had postdoc visitors in 2016, 2017-2018 and 2019-2020.

Conclusion

Based on above facts, in my opinion, Dr. Róbert Jajcay completely fulfils all the requirements to be promoted to Professor of Mathematics.

Sincerely,

Prof. István Kovács
Faculty of Mathematics, Natural Sciences
and Information Technologies
University of Primorska