CURRICULUM VITAE

Anna Muranova

April 3, 2019

Personal details

Name: Anna Muranova.

Date of birth: 15 November 1991.

Place of birth: Vitebsk, Republic of Belarus.

Citizenship: Republic of Belarus.

e-mail: anna.muranova@gmail.com

Spoken languages: Russian (mother tongue), English, German (B2), Polish (C1), Spanish.

Present mathematical interests: Differential operators on graphs, Laplace operator on graphs, Electrical networks.

Programming languages: Pascal, C, C++, Java, SQL.

Education

01.09.2009 – 30.06.2014: Student of the Mathematical Department of Belarusian State University (Minsk, Belarus).
Graduated with a diploma with honors.
Qualification: mathematician.

01.10.2015 – 30.08.2016: Student of the Department of Mathematics and Computer Science of University of Warmia and Mazury (Olsztyn, Poland). Specialization: Multimedia techniques.
Not finished (one year of two required was successfully completed).

01.10.2016 – present time: Doctoral Student of the International Research Training Group 2235 at the Mathematical Department of Bielefeld University (Bielefeld, Germany).

Diploma/Master thesis

Scientific advisor: Valerii Vatslavovich Benyash-Krivets.
Title of the diploma thesis: "Varieties of representations of finitely generated groups."

Abstract of the diploma thesis: Varieties of low-dimensional representations of some finitely generated groups were considered and some theorems about the number of irreducible components were proved. As auxiliary results, dimensions of commutator varieties for matrices of dimensions 2, 3 and 4 were calculated.
Grade for the diploma thesis: 10/10.

Description of the PhD project (not finished yet)

Scientific advisor: Alexander Grigoryan.
Topic: "Laplace operator on weighted graphs and related problems."

The aim of my PhD project is to construct a mathematical model, which describes the ladder network (a particular example of electric network from Feynman's Lectures on Physics), and to generalize this model to other infinite electric networks. There are some physical papers on this topic, but there is no an appropriate mathematical model for this kind of networks, while networks just with resistors are related with the Laplace operator and random walks on weighted graphs. For now on, I have constructed the mathematical model of the finite electric network with impedances. It is a graph with complex weights on edges and two fixed boundary points. For such graphs the Laplace operator has been introduced and Dirichlet problem for them has been described. I have first introduced the definition of effective impedance for such networks and have proved that the conception of effective impedance for finite network is well-defined and that so defined effective impedance satisfies basic physical properties. The theorem of conservation of complex power was proved. The other approach to ladder network is to consider graphs with weights of edges from ordered field of rational functions. In this approach I proved the existence and uniqueness of solution of the Dirichlet problem.

Talks and posters

- Poster "On the notion of effective impedance" (Workshop "Analysis of nonlocal and nonsmooth models", March 25 - 29, 2019, Bielefeld, Germany).
- Talk "On the notion of effective impedance via ordered fields" (Conference "Differential Operators on Graphs and Waveguides", February 25 - March 1, 2019, Graz, Austria).
- Poster "Conservation of complex power in electric network" (Workshop "Young Women in Mathematical Physics", September 24 - 28, 2018, Bonn, Germany).
- Talk "Electric networks and complex-weighted graphs" (The 6th Gdańsk Work-

shop on Graph Theory, July 4, 2018, Gdańsk, Poland).

- Poster "Electric networks with impedances" (Sixth Bielefeld - SNU Joint Workshop in Mathematics, March 17, 2018, Seoul, South Korea).
- Talk "On effective impedance of electric networks" (Geometric Analysis Seminar, December 5, 2017, Bielefeld, Germany).
- Talk "On varieties of representations of finitely generated groups" (71st scientific conference of undergraduate and graduate students of Belarusian State University, May 18 - 21, 2014, Minsk, Belarus).

Research stays

- Seoul National University, March 2 - August 25, 2018 (Seoul, South Korea).

Practical work experience

01.10.2012 – 01.06.2013: Laboratory assistant at Research Institute for Applied Problems of Mathematics and Informatics of Belarusian State University (Minsk, Belarus). At this period I participated in a project on investigating genetic sequences (DNA) using probability theory.

01.08.2016 – 30.08.2016: Trainee (Programmer) at "Tangram Care" (Bialystok, Poland). In this time I was worked in the direction of computational linguistics.

Publications

1. Muranova A. *On dimensions of commutator varieties in case of low-dimensional matrices*. Proceedings of 71th scientific conference of undergraduate and graduate students of Belarusian State University, Minsk, May 18–21, 2014: in 3 parts, Part 1, pp. 18–22. – Minsk : Publishing center of BSU, 2014. (In Russian: Муранова А. Ю. *О размерностях коммутаторных многообразий в случае матриц малой размерности*. Сборник работ 71-й научной конференции студентов и аспирантов Белорусского государственного университета, Минск, 18–21 мая 2014 г. : в 3 ч. Ч. 1, стр. 18–22. – Минск : Изд. центр БГУ, 2014.)

Other skills

1. I have participated in the Workshop "Making an impact: Communicating, networking, and presenting" (February, 2018, Norderney, Germany).

2. I have participated in the Workshop on Scientific Writing in English (November, 2018, Bielefeld University, Germany).
3. I have participated in the Workshop on Time and Self Management (November, 2018, Bielefeld University, Germany).
4. I have finished an art school (September, 2003 – July, 2007, Vitebsk, Belarus)
5. I have studied one year at the Spanish-speaking secondary school (Bachillerato) and finished the year with an excellent grade (August, 2007 – July, 2008, Huajuapan de Leon, Mexico)