

# Tatiana Babicheva

## Research Scientist

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in babicheva

## Professional experience

### Specialist in Operational Research, **RATP Smart Systems**

2021 – now

Paris, France

Development of new methods of multimodal trajectory searches in public transport networks

### Researcher, **VEDECOM**

2016 – 2021

Versailles, France

Participation in the development of the VIPSIM program at VEDECOM (using the C++ programming language). Development and implementation of optimisation algorithms for a fleet of autonomous taxis

### Research Associate, **Keldysh Institute of Applied Mathematics**

2015 – 2016

Moscow, Russia

The research under the federal project RFMEFI60414X0052, «Development of effective numerical methods for finding equilibria in transport networks»

### Researcher, **MIPT**

2012 – 2014

Moscow, Russia

Research on mathematical and psychological aspects of cooperative and non-cooperative games

## Teaching experience

Assistant professor of graph algorithms, 1st year of Master's

### Computer science department, **UVSQ**

2018 – 2019

Versailles, France

Lecturer and professor of mathematics

### **MIPT Olympiad school**

2016

Moscow, Russia

Assistant professor of informatics, 2nd year of Bachelor's

### Department of Informatics and Computational Mathematics, **MIPT**

2014 – 2016

Moscow, Russia

Assistant professor of Calculus and Linear Algebra, 1st year of Bachelor's

### Department of higher Mathematics, **MIPT**

2013 – 2014

Moscow, Russia

Teacher of mathematics

### **Lycée 5**

2006 – 2012

Dolgoprudny, Russia

## Skills



### Fields of Scientific Interest

Game Theory, Operational Research, Reinforcement Learning, Artificial Intelligence, Intelligent Transport Systems, Traffic, Optimisation, Online optimisation, Autonomous vehicles



### Programming languages

C, C++, Python, R



### Other

Distributed computing, Computational science, Computational methods, Queuing theory, Machine Learning

## Education

PhD in informatics. Machine Learning for the distributed and dynamic management of a fleet of autonomous taxis and shuttles, **Université Paris-Saclay**

2017 – 2021

PhD in applied mathematics. Methods of mathematical and imitational modelling of local interaction processes in transportation systems, **MIPT**

2012 – 2016

MSc in Applied Mathematics and Physics. Generalisation of the Treiber's model in case of multilane roads (50 pages, defended with honors), **MIPT**

2010 – 2012

BSc in Applied Mathematics and Physics. Business simulation game of national economy (60 pages, defended with honors), **MIPT**

2006 – 2010

## Achievements

The French-Swedish Prize for young researchers

2018

The Third Martin Lowson Paper Award

2017

Geometry, second prize on National Olympiad

2006

## Publications

### Selected papers

- Babicheva, Tatiana, Matej Cebecauer, Dominique Barth, et al. (2020). "Empty Vehicle Redistribution with Time Windows in Autonomous Taxi Systems". In: *ACM/IMS Transactions on Data Science*.
- Babicheva, Tatiana, Matej Cebecauer, Jenelius Erik, et al. (2020). "Integrating Demand Responsive Services into Public Transport Disruption Management". In: *IEEE Open Journal of Intelligent Transportation Systems*.
- Babicheva, Tatiana and Wilco Burghout (2019). "Empty vehicle redistribution in autonomous taxi services". In: *EURO Journal on Transportation and Logistics*.
- Babicheva, Tatiana, Wilco Burghout, Ingmar Andreasson, et al. (2018b). "Empty vehicle redistribution and fleet size in autonomous taxi systems". In: *IET Intelligent Transport Systems*.
- Babicheva, Tatiana, Wilco Burghout, Ingmar Andreasson, et al. (2018c). "The matching problem of empty vehicle redistribution in autonomous taxi systems". In: *Procedia computer science*.
- Babicheva, T. S. and D. S. Babichev (2015). "Numerical Methods for Modelling of Traffic Flows at Research and Optimisation of Traffic on the Signal-controlled Road Intersections". In: *Procedia Computer Science*.
- Babicheva, T. S., A. V. Gasnikov, et al. (2015). "Two-stage model of equilibrium distributions of traffic flows (In Russian)". In: *Proceedings of MIPT*.
- Babicheva, T.S., S.L. Babichev, and V.P. Osipov (2015). *Architecture and methodological support module simulation of transport processes in a networked computer lab (In Russian)*. Preprints of the Keldysh Institute of Applied Mathematics.
- Tatiana, Babicheva (2015). "The use of queuing theory at research and traffic optimisation on the signal-controlled road intersections". In: *Procedia Computer Science*.

### Selected conference papers

- Babicheva, Tatiana, Matej Cebecauer, Erik Jenelius, et al. (2020). *Public Transport Disruption Management by Collaboration with Demand Responsive Services*.
- Babicheva, Tatiana, Wilco Burghout, Dominique Barth, et al. (2019). *Construction and analysis of a weighted city road graph using OpenStreetMap and statistical GPS data*.
- Babicheva, Tatiana and Irina Ulianova (2019). *The history of mathematical modelling of traffic flows in the 1920-1970s*.
- Babicheva, Tatiana, Wilco Burghout, Ingmar Andreasson, et al. (2018a). *Empty vehicle redistribution and fleet-size in autonomous taxi systems*.

## Patents

«Programme for micromodelling of multilane roads and crossroads BTSSIM», Patent of computer programme 2016610003 RF, 2016.

## Languages

Russian  
English  
French



## Scientific visits and collaborations

Visit to KTH Stockholm granted by ASFR

 May 2019

 Stockholm, Sweden

Moderator of the section "ITS development in the World changing context"

**Kazan digital week - 2020**

 September 2020

 Kazan, Russia

## Managerial experience

Head of admissions committee on math

**MIPT**

 2011 – now

 Moscow, Russia

Scientific supervisor

**MIPT**

 2014 – now

 Russia

Supervising of students of Bachelor's and Master's thesis. Fields of game theory, operational research, transportation, computer science

Head of mathematical department, Olympiad school, **Moscow Institute of Physics and Technology (MIPT)**

 2016

 Moscow, Russia

## Books

- Babicheva, T. et al. (2018). *Handbook on Olympiad mathematics. Level A1 (In Russian)* ISBN 978-5-00058-886-4.
- Babicheva, T. S., S. L. Babichev, et al. (2018). *Materials of the mathematical department in 2 parts (In Russian)*.
- Babicheva, T.S., S.L. Babichev, and D.S. Babichev (2017). *Materials of the mathematical department (In Russian)*.
- Babicheva, T.S. and Babichev S.L. (2016). *Introduction to game theory and operations research. (In Russian)*.
- Babicheva, T.S., Babichev S.L., et al. (2016). *Teoretical minimum for MIPT students (In Russian)* ISBN 978-5-9907163-7-7.