

**The Report of the Dissertation Council on Mathematical and Computer Modeling at
Kazakh National Research Technical University named after K.I. Satbayev to awarding
the degree of Doctor of Philosophy(PhD) by specialty 6D070500 - "Mathematical and
computer modeling", 8D06104 - "Mathematical and computer modeling" for 2021**

1. The number of hold meetings

The Dissertation Council has hold 1 (one) meeting during its work with taking into account the requirement to notify about the upcoming defense no later than one month before the deadline date.

2. Names of council members who attended less than half of the meetings – none

3. List of doctoral students with an indication of the organization

№	Full name	Name of University
1	Gulnur Tolebi	Kazakh-British Technical University

4. The brief analysis of dissertations that have been considering by the Council during the reporting year

The Dissertation Council considered 1 (one) thesis in the reporting year. The name of dissertation by specialization given below:

№	Full name	Thesis name	Code and name of the specialty
1	Gulnur Tolebi	Adaptive Control of Traffic Flows	6D070500 – «Mathematical and Computer Modeling

4.1. Analysis of the dissertation work of Tolebi Gulnur:

Dissertation work of doctoral student Tolebi Gulnur on the topic «Adaptive control of traffic flows», is characterized by relevance and scientific novelty.

The aim of the research: The goal of the work is researching and developing the effective methods for link flow estimation and traffic signal control by using Com- putational Intelligence Techniques.

Scientific novelty: Based on the studies performed, the following results were obtained:

- an adaptive traffic signal controller is proposed that works without any knowledge of the environment (Q-table, Deep-QNetwork); A system based on the reinforcement learning method has been developed, where the reward function is one of the main components. A new reward feature has been introduced.
- possibility to predict the link flow in the near future based on pre gained data, if given data goes back and is sampled every period of time is proved;
- new models for predicting the intensity of flow based on deep learning are presented; The set of deep learning models proposed in this dissertation represent a novel approach to predicting flows in transport networks. The traffic flow is considered as the probability of creating vehicles per unit of time. This value is not an exact share of arrived vehicles, but represents some other property of the traffic flow on this link.
- solving the problem of TSC using the MAS approach for a non-stationary environment is proposed;
- estimation of optimal signal plan for a given traffic network if we know the demand is implemented;

4.1.2. Connection to the subject dissertations with national state programs as well as targeted republican and regional scientific and technical programs.

The dissertation work corresponds to the tasks of the State Program "Digital Kazakhstan" 2018-

2022. According to the program, a set of measures has been developed in 5 key areas, one of which is the transition to a digital state. According to the plans for 2022, large Kazakhstani cities will develop within the framework of the Smart City concept, which includes intelligent traffic control.

4.1.3. Analysis of the level of use of the scientific results of the considered works, proposals for the expanded implementation of the practical significance.

The algorithms and models developed during the research can be used for developing new methods for traffic signal control. They also can be integrated in any kind of projects related to the Intelligent Transportation System. The obtained research results can be used for a further theoretical investigation of the given topic, in the traffic control, traffic flow prediction and for the optimization of the existing traffic signal control systems.

5. Analysis of the work of reviewers (with examples of the most low-quality reviews)

Reviewers of dissertations of doctoral students for the degree of Doctor of Philosophy (PhD), were appointed persons in accordance with the requirements of the Standard Regulations on the dissertation Council.

Information about the appointed reviewers is provided below:

№	Full name	Reviewers	
1	Gulnur Tolebi	Mansurova Madina - candidate of physical and mathematical sciences, acting Professor, head of the Department of Artificial intelligence and Big Data Al-Farabi Kazakh National University (01.01.10).	Abay Nussipbekov – PhD, assistant professor, faculty of engineering and natural sciences, Suleyman Demirel University

In order to ensure compliance with the requirements of the Standard Regulations on the work of the Dissertation Council, each reviewer was sent a memo with the requirements for the content and design of the review of the dissertation work.

All the reviews were submitted on time and in accordance with the requirements of the Committee for control in education and science of MES of RK.

There are no negative reviews.

- **Information on the accepted negative decisions:** there is no negative decisions accepted by the dissertation work.

- **Information on doctoral students who did not defend their dissertations (for what reason they did not defend their dissertations):** According to the defense plan, in the DC, the number of applicants who planned to defend their dissertations by the end of 2021 was 1 person.

5. Proposals for further improvement of the system of training of scientific personnel - no

6. Data on the dissertations considered for the degree of Doctor of Philosophy PhD:

Dissertation Council	6D070500 - "Mathematical and computer modeling"	8D06104 - "Mathematical and computer modeling"
Dissertations withdrawn from consideration	-	-
Including those removed from the DC	-	-
Dissertations that received negative reviews from reviewers	-	-

Dissertations with a positive decision based on the results of the defense	1	-
Including those from other organizations	1	-
Dissertations with a negative decision based on the results of the defense	-	-
Including those from other organizations	-	-
Total number of dissertations defended	1	-
Including those from other organizations	1	-

Chairman of the dissertation council

Scientific Secretary of the Dissertation Council



N. Dairbekov

L. Sarybekova

Stamp and date "_____" 2021