

Project goals

The main goal of the project is to develop efficient and accurate methods to simulate urban traffic. Such methods should be adapted to be performed on many computers simultaneously to enable simulation of large cities in a short time. The developed methods are to allow efficient use of high performance computing (HPC) class equipment that provides tens of thousands of computing cores. The simulation results obtained are to reflect the phenomena observed in reality as accurately as possible.

The importance of research topics

The problem of congested streets is one of the more serious problems of modern civilization, which applies to both highly developed and developing countries. It occurs commonly in large agglomerations, but does not bypass small towns. Research on ways to optimize urban traffic has been conducted for many decades, but the complexity of the problem causes that the problem remains unsolved. Computer simulation is widely used in this type of research. Current simulation methods have known limitations on the accuracy of reflecting reality and the size of environments that can be simulated.

Description of research

The project will develop further improvements to existing simulation models and how to adapt them to the requirements of the simultaneous use of multiple computers. The models will be based on ideas and results available in the literature, while the methods of using HPC class equipment will be based on our own, effective solutions to the problem of scaling simulation computations. The results obtained will be carefully verified for correctness and compliance with reality. For this purpose, experimental data collected in many different places around the world will be used.

Expected effects

New, more efficient and accurate simulation methods will certainly find numerous applications both in research in this field and in practice. They will allow to design effective communication solutions, improve existing systems, study the causes of traffic jams, analyze various variants of traffic control solutions, and even optimize the operation of traffic lights in real time.