

## Modeling of acoustic waves with Lattice Boltzmann Method

Modeling of the behavior of sound waves showed its applied significance in various areas of life, ranging from using in the field of scientific research to using in computer games.

Objective of project is creation of virtual environment for modeling the behavior of acoustic waves in porous and labyrinthine structures and creation tools for research of it.

There are different methods of modeling the sound, but it was decided to choose the Lattice Boltzmann Method (LBM): this method is relevant to use, because, due to its novelty, it does not have a large spread in the application of acoustics, but it has great potential. It is not complicated and has the possibility of good parallelism.

The program was written in C++ using OpenGL and SDL graphics libraries, programming model CUDA (**Compute Unified Device Architecture**) for acceleration of computations and OpenMP - standard for parallel computing.

The result of the project is the virtual environment for the modeling of acoustic waves in two-dimensional space, which has decent functionality and can become the basis for other projects in this area. LBM has shown its ability to compete with other methods in this field both in quality of modeling and speed.

The results of the project can be used in investigation of sound conductivity of small-scale materials with a porous structure and simulation the passage of the labyrinthine structure by acoustic waves. Functionality and user's interface of program is oriented on specialists in the field of acoustics and audio equipment.