**Brief information about the project**

Name of the project	AP22688191 «High-performance construction and visualization of unstructured adaptive grids» (0124PK00207)
Relevance	This project is dedicated to the development of an application for the construction and visualization of three-dimensional adaptive grids. The peculiarity lies in the use of neural networks to build adaptive computational grids, in the use of a high-performance visualization module based on a new shader model (mesh shaders).
Purpose	The goal of this project is to study the construction of structured and unstructured grids using high-performance computing and neural network algorithms, to develop an application for visualizing 3D grids with a large volume of primitives.
Objectives	To achieve the goals of this project, the following tasks are planned: 1) Development of a high-performance visualization module for displaying computational grids using mesh shaders and Vulkan API. 2) Development of a parallel algorithm for constructing 3D unstructured computational grids. 3) Using neural network algorithms to build structured and unstructured computational grids.
Expected and achieved results	- Parallel algorithms for constructing three-dimensional adaptive computational grids will be researched and implemented; - Algorithms will be developed for building structured adaptive computational grids using physics-informed neural networks; - Algorithms will be developed for building unstructured adaptive computational grids using generative algorithms of neural networks; - A high-performance application for visualization of structured and unstructured computational grids will be developed.
Research team members with their identifiers (Scopus Author ID, Researcher ID, ORCID, if available) and links to relevant profiles	1. Mustafin Maksat, master of natural sciences, senior lecturer: h-index – 1, ResearcherID: AGG-1615-2022, ORCID: 0000-0002-3655-0771, Scopus Author ID: 57221606197. 2.Turar Olzhas, PhD: h-index – 4, ORCID: 0000-0002-6720-0045 Scopus Author ID: 56523413700.
Publications list with links to them	1. Turar, O., Mustafin, M., & Akhmed-Zaki, D. (2025). Adaptive Grid Generation by Solving One-Dimensional Diffusion Equation Using Physics-Informed Neural Networks. *Algorithms*, *18*(6), 334. https://doi.org/10.3390/a18060334 https://www.mdpi.com/1999-4893/18/6/334
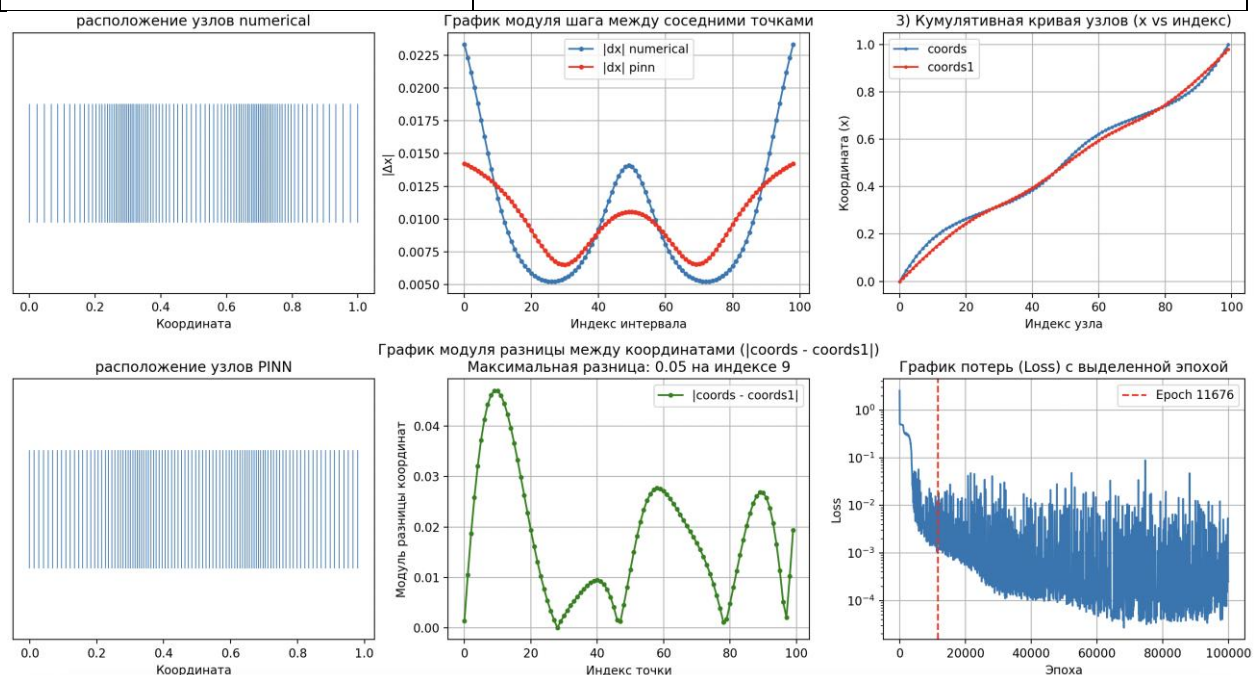
Figure 1. Results of one-dimensional adaptive mesh generation using the numerical method and the PINN method.
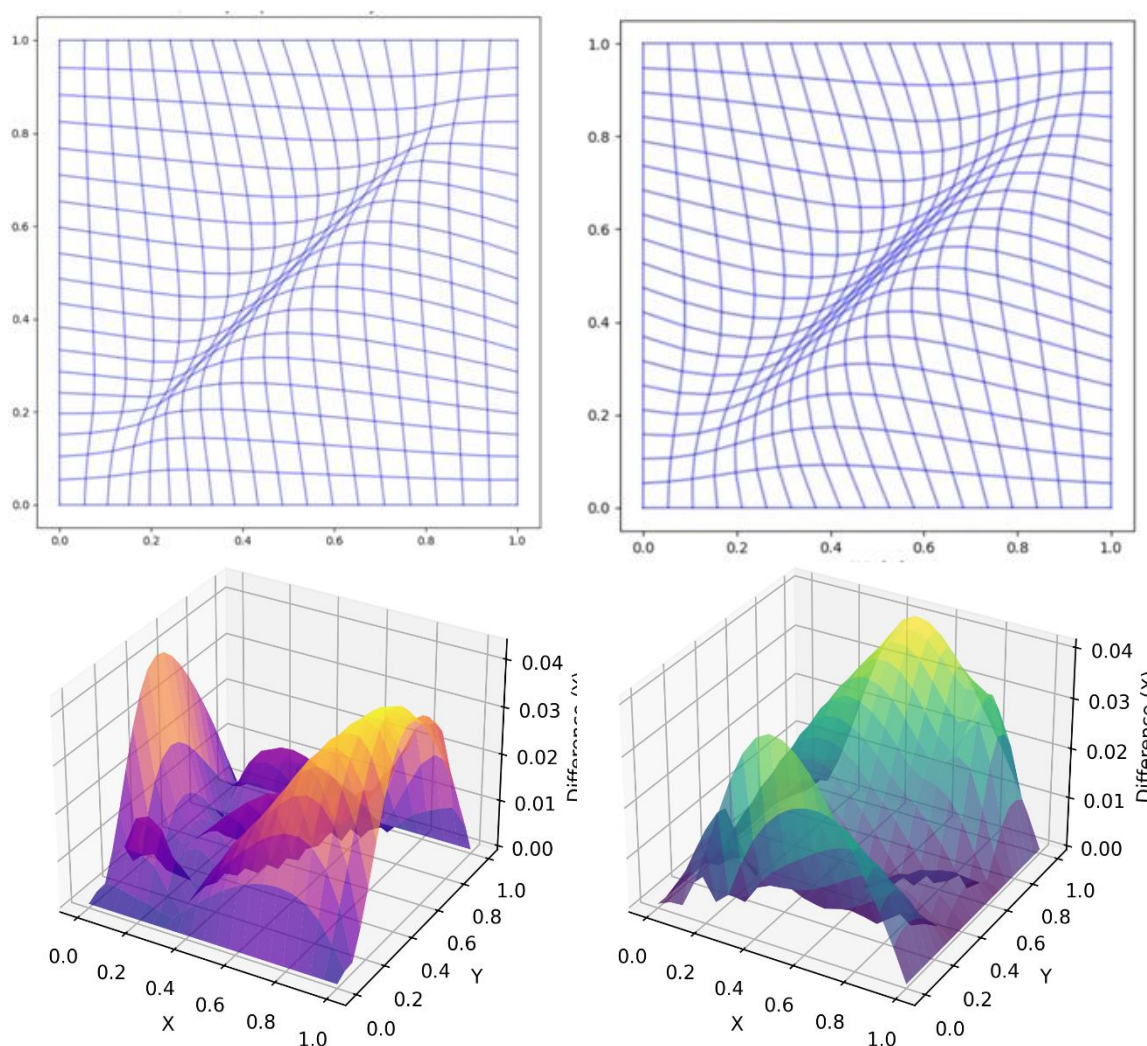
Figure 2. Results of two-dimensional adaptive mesh generation using the numerical method and the PINN method.