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Novotarskyi, M.
Nesterenko, O.</td></tr>
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<tr><th>abstract</th><td>Context. The Poisson equation is the one of fundamental differential equations, which used to simulate complex physical processes, such as fluid motion, heat transfer problems, electrodynamics, etc. Existing methods for solving boundary value problems based on the Poisson equation require an increase in computational time to achieve high accuracy. The proposed method allows solving the boundary value problem with significant acceleration under the condition of acceptable loss of accuracy. Objective. The aim of our work is to develop artificial neural network architecture for solving a boundary value problem based on the Poisson equation with arbitrary Dirichlet and Neumann boundary conditions. Method. The method of solving boundary value problems based on the Poisson equation using convolutional neural network is proposed. The network architecture, structure of input and output data are developed. In addition, the method of training dataset generation is described. Results. The performance of the developed artificial neural network is compared with the performance of the numerical finite difference method for solving the boundary value problem. The results showed an acceleration of the computational speed in x10â€“ 700 times depending on the number of sampling nodes. Conclusions. The proposed method significantly accelerated speed of solving a boundary value problem based on the Poisson equation in comparison with the numerical method. In addition, the developed approach to the design of neural network architecture allows to improve the proposed method to achieve higher accuracy in modeling the process of pressure distribution in areas of arbitrary size.</td></tr>
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