https://cejsr.academicjournal.io

Visualization and Modeling of Seismic Processes.

Samatov Lazizbek Zokirogli
Termez State University
Faculty of Architecture and Construction
3rd year student of architecture education.

Anvar Ubaydullayev Azamovich
Senior Lecturer, Termez State University.
Deputy Dean for Youth Affairs and Spiritual and Enlightenment Affairs
Faculty of Architecture and Construction.

Key words: alternative energy sources (wind, geothermal, solar, hydropower and biofuel), geophones, seismograms.

Abstract: This article describes the modeling and visualization of seismic processes.

According to today's forecasts, energy consumption in the world will continue to grow rapidly due to the development of science and technology. Despite the development of alternative energy sources (wind, geothermal, solar, hydropower and biofuels), as well as the growing importance of nuclear power, traditional energy sources such as oil and natural gas remain a critical resource. While the reserves of conventional (easily recoverable) oil are significantly depleted, the development of unconventional (heavy) oil is actively beginning all over the world. The main difficulty of this process is the lack of effective approaches to extract a significant percentage of the volume of the entire deposit. In addition, the question of effective search methods for fractured clusters occurring at great depths and containing oil and gas products remains open. One of the approaches to solving these problems is the development of new computer programs and complexes for calculating the process of seismic exploration of the Earth's interior, which will allow modeling field experiments with a high degree of accuracy. In this case, it becomes possible to set a certain geometry of the medium (the number and orientation of fluid-containing cracks, layers of various rocks, etc.) with subsequent obtaining of a synthetic response. To register the signal-response in practice, special devices are widely used - seismic receivers. They allow you to register the displacement of the earth's surface at the point of their installation as a function of time. One of the types of their classification is the division according to the type of registration: single-component and multi-component sensors. With single-component registration, only the vertical component of the displacement is recorded. With multicomponent registration, projections of displacement to the north and east are also fixed. In addition, depending on the physical principle on which the sensor is based, it is possible to register the displacement, speed or acceleration of the daylight surface.

Thus, with the use of computer simulation, the following scientific and technical problems can be solved:

- assessment of the possibility of registering a useful response from a fractured structure with given parameters against the background of noise;

— development of new methods and techniques for processing field measurement data in order to isolate a signal that carries information about the structure of the deposit;

– search for the optimal arrangement of disturbance sources and recording seismic receivers to study

the geological structure with specified properties.

The Seismograph program, which allows semi-automatic construction of synthetic seismograms based on the results of computer simulation. To ensure cross-platform, together with high speed and ease of code maintenance, Python was chosen as the development language [3]. To implement the GUI (Graphic User Interface), the Tkinter library [3] was chosen due to its cross-platform nature, the availability of versions for Linux, Microsoft Windows, Mac OS, and also being included in the Python standard library. The use of the Gnuplot command Open Source utility made it possible to implement, with minimal effort, drawing a seismogram based on prepared input data and saving it in PNG (Portable Network Graphics) format for further use in presentations, publications, etc. The developed program has been tested and successfully works both on Windows and Unix family systems.

It is often convenient to conduct a detailed analysis of a certain portion (limited by geophone numbers and record time range) of all stored data. The ability to limit the displayed time range is implemented by the "From Time Number" and "Until Time Number" parameters. They set the numbers of time readings of the sensors, between which all time points will be displayed. In addition to integer values, the field can also take string values "start" and "end", meaning the beginning of the record and the end of the record (calculation), respectively. Skillful use of these parameters makes it possible to select the signals-responses of interest to the interpreter with high accuracy. The possibility of spatial thinning of information is also provided. In addition to building the entire seismogram from seismic sensors located at regular intervals along a straight line, it is possible to select: the first sensor in the series (“Start Receiver”), the number of sensors in the series (“Receivers Number”), and the interval of sensors to be skipped (“Every K Receiver”).

REFERENCES:

1. Levyant V. B., Petrov I. B., Muratov M. V. Numerical modeling of wave responses from a system (cluster) of subverticalmacrofractures. Seismic Technologies. — 2012.
2. Golubev V. I., Kvasov I. E., Petrov I. B. Impact of natural disasters on ground structures // Mathematical Modeling. — 2011.
3. Levyant V. B., Petrov I. B., Muratov M. V., Byko S. A. Investigation of the accountability of the formation of the front of scattered converted waves from the zone of macrocracks. SeismicTechnologies. —2013.
4. Golubev VI, Petrov IB, Khokhlov NI Numerical simulation of seismic activity by the grid-characteristic method // Journal of Computational Mathematics and Mathematical Physics. — 2013.
5. Shamsidinovna, M. N., & Akmalovna, A. M. Improving the Living Standards of the Population by Measuring the Digital Transformation in Services. JournalNX, 282-286.
6. Shamsidinovna, Mansurova N., and Norboev A. Ismoilovich. "Conceptual Bases of Formation of Innovative Types of Employment in the Labor Market." JournalNX, 2021, pp. 287-291.
7. Shamim, M. M. I. (2016). Opportunities in BPO Sector for Youth Study of Bangladeh. Business Review Bangladesh, 5(1 & 2), 25–30. https://doi.org/10.13140/RG.2.2.16009.57440
8. Shamim, Md. M. I. (2022). Exploring the Success Factors of Project Management. American Journal of Economics and Business Management, 5, 64–72.

9. Shamim, Md. M. I., Shavarebi, K., & Raihan, M. (2020). PLANNING OF INFORMATION AND COMMUNICATION TECHNOLOGIES TRAINING PROJECT AND ITS IMPACT: A CASE STUDY OF BANGLADESH. Asia Pacific Journal of Management, 5.