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Theoretical Prerequisites for the Creation of a Dynamic Model of the Process of Displacement of the Earth's Surface

If we follow the way of studying the process of displacement of the Earth's surface above the mine workings sewage treatment, it can be said that this study is the ultimate goal of creating models of processes taking place over the mining operation. And, like all modeling, the modeling of the displacement process has the following aims:

1. To understand the essence of the process of rock and surface movement;
2. To learn to manage the process of displacement and to determine the best control methods in order to ensure safety of undermining objects;
3. To predict the direct or indirect consequences of part-time work;
4. To solve applied problems.

Each simulated process or object has a large number of different properties. It is necessary to identify the main, most significant, properties that correspond to the goal of a simplified representation of a real object, process or phenomenon represented by the model in the process of its building. The models are divided into static and dynamic by the time factor.

If we consider studies on the motion of the Earth's surface in coal deposits, then mathematical models of the displacement of the earth's surface practically all belong to static, because they describe the consequences of subsidence of the surface at the end of the process of displacement.

It should be noted that the statistical methods of forecasting do not provide an opportunity to obtain correct forecasts of the development of the shift process, while dynamic models allow to solve such problems successfully.

Thus, it can be stated that to date there is no full-fledged methodology for modeling the process of displacement of the Earth's surface over a moving face, especially in the stage of formation of the trough.

The depth of reservoir development in the area corresponding to the formation of the trough changes insignificantly in the conditions of the Western Donbass.

The change in the composition, properties, and stress-strain state of rocks will be neglected, as it is generally accepted in the practice of studying the displacement of rocks and the Earth's surface.

To facilitate the creation of a dynamic model, we will initially accept the speed of movement of the cut face within the limits of the lava constant, and take that the very movement of the face is non-stop.

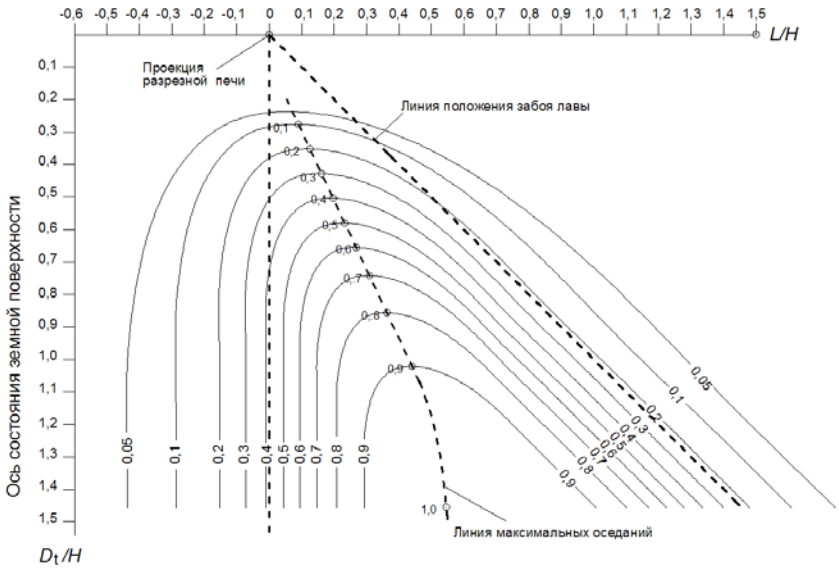

Fig. 1. Chronoisolinear model of the process of subsidence of the Earth's surface

Undoubtedly, the accepted simplifications will reduce the quality of the model being created, and it will not be fully adequate to the original object, i.e. the process of displacement of the Earth's surface over the moving face at the stage of formation of the trough.

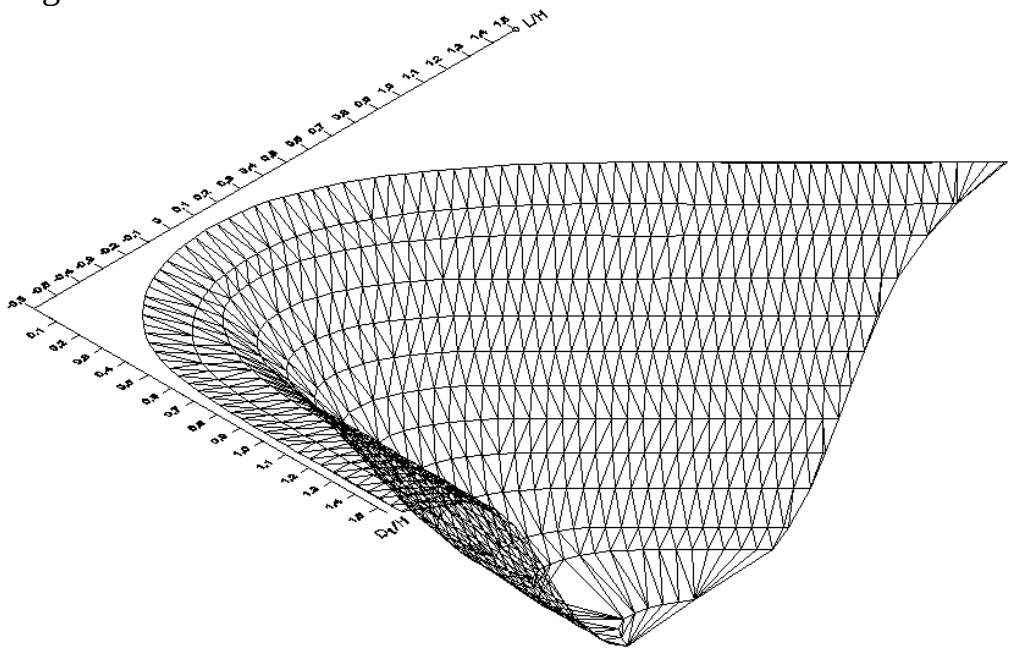

Fig. 6. The volumetric model of the development of the process of subsidence of the Earth's surface over the coal-face workings

The model of the development of the process of subsidence of the Earth's surface above the clearing makes it possible to simplify the construction of the profile of the trough. In addition, there is the possibility of a detailed analysis of the development of the settling process, depending on the degree of development of mining operations. The volumetric model allows to better understand the physical essence of the processes in the extra-mining rock mass.