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STUDY OF FRACTURING OF BLOCK GABBRO KURHANTSI DEPOSITS

The study of fracturing is a topical scientific and applied issue for enterprises which produce block products. Detailed study of spatial orientation of fractures will determine an expected output of blocks in mineral deposits or in some areas; which, in turn, will reduce economic costs and enable planing technical measures to improve the quality of the final product. The system of an enterprise activity is connected with the system of fractures and it puts the vector of a deposit developing and demining.

The depths of the fractures localization were broken at intervals by the Stedzherss formula to assess the impact of fractures localization on the angle of fractures depth:

$$h = \frac{X_{max} - X_{min}}{1 + 3.2 \log n} = 3,54 \text{ м}; \quad (1)$$

where X_{max} – maximum distance between fractures ($X_{max} = 34,66 \text{ м}$);

X_{min} – minimum distance between fractures ($X_{min} = 2,8 \text{ м}$);

n – a number of units of the totality ($n = 265$).

The method of Kriging is used to build vector models and models of contours of a fracture incidence angle. The mathematical description of the method is as follows:

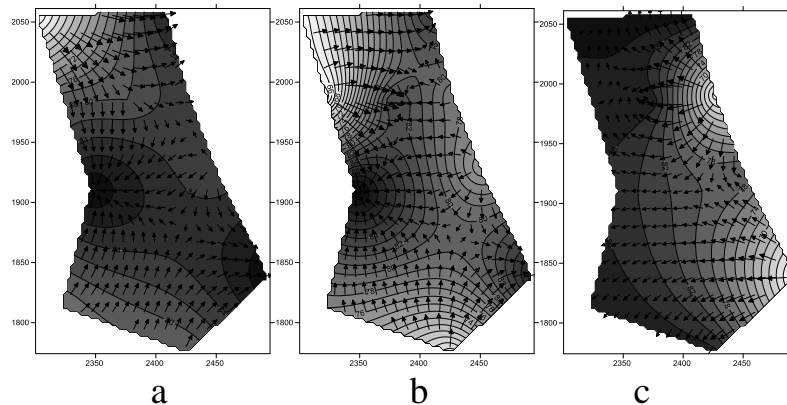
$$Z_V^* = E_{i=0}^N \lambda_i Z(x_i); \quad (2)$$

λ_i -the weight at which the estimate is unbiased;

$Z(x_i)$ – the value of output samples;

N – the number of samples.

Implementation of the proposed methods of fracturing study allows getting reduced models of the angle changes of fractures incidence for nine intervals:



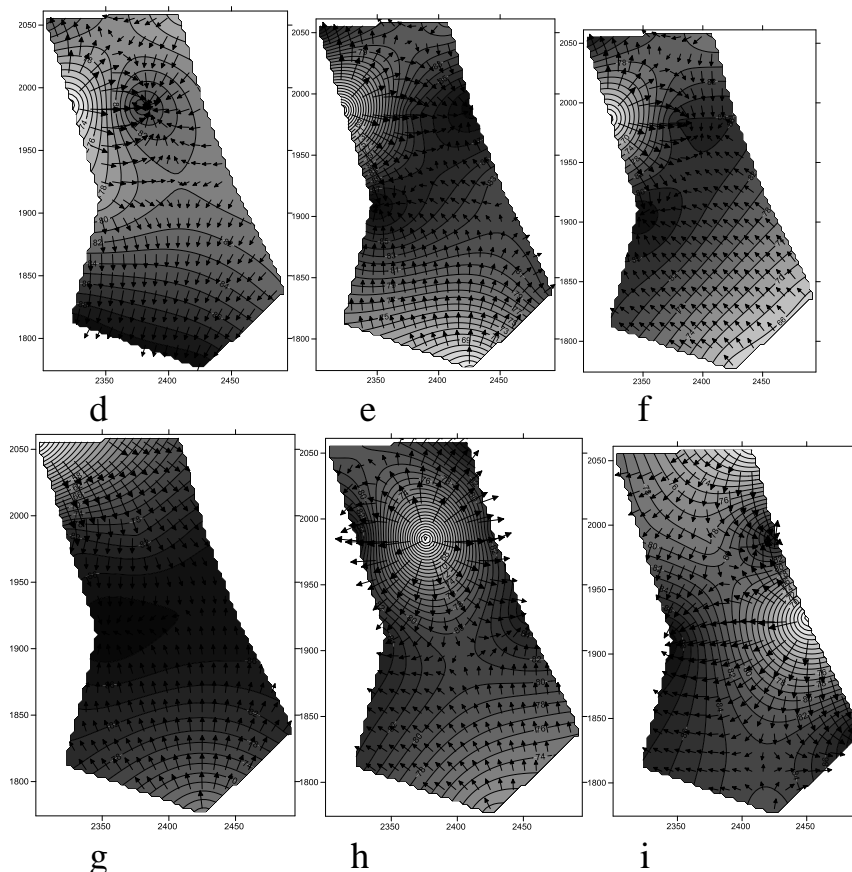


Fig. 1. Reduced models of the angle changes of fractures incidence for nine intervals 2,8 – 34,66 m.

a(2,8-6,34 m), b(6,34-9,88 m), c(9,88-13,42 m), d(13,42-16,96 m), e(16,69-20,5 m),
 f(20,5-24,04 m), g(24,04-27,58 m), h(27,58-31,12 m),
 i(31,12-34,66 m)

In the study of patterns of changing angles of incidence for 2,8-6,34m and 6,34-9,88m intervals (Fig. 1 a, b), a common tendency in the angle of incidence of fractures in the western and south-eastern part of the deposit, with a gradual decrease in the angle of the north and south direction, can be observed.

The interval 9,88-13,42m (Fig. 1 c) shows the increase of the angle of fractures incidence from two eastern pole points in the northern and southern west direction respectively, if compare to 2,8-6,34m and 6,34-9,88m intervals.

The interval 13,42-16,96m (Fig. 1 d) is characterized by a partial increase in the angle of incidence which is concentrated in the central part of the deposit; its maximum values are concentrated in the south part of the deposit.

The intervals 16,69-20,5m, 20,5-24,04m, 24,04-27,58m (Fig. 1 e, f, g) are also characterized by the increase of the angle of fractures incidence from the north and south to the middle. Thus, these intervals demonstrate the opposite tendency compared to the intervals 9,88-13,42m and 13,42-16,96 m.

The incidence angles at the interval 27,58-31,12m (Fig. 1 h) increase from the peak north-central part in all directions, as well as from the southern part in the northern direction.

The interval 31,12-34,66m (Fig. 1 i) has an ambiguous character. There is a decrease in the incidence angle from the central-eastern, south-eastern and western parts in all other directions.

Having built the model of the change of fractures incidence angle for the entire field and for all intervals of angles of fractures occurrence (Fig. 2), it can be proved that the most efficient blocks output due to the vertical angles of occurrence is observed in the central western part of the deposit; the least efficient blocks output is observed in the north-western and southern parts of the deposit. The mining process can be carried out at the heights of quarry face which correspond to the intervals of fractures grouping according to the incidence angles.

Conclusion: the results of the study of spatial orientation of fractures show that gabbro surface is fractured and affected by weathering processes. The entire area of a rock massif has the incidence angles approximately 80° or less. The incidence angles in the central-western part reach 9° and they have a favorable shape in terms of technical and economic parameters.

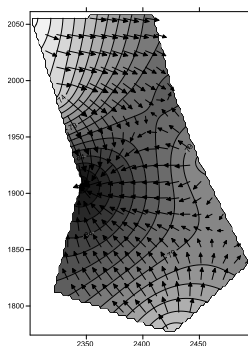


Fig. 2. The model of the change of fracture incidence angle for the whole deposit

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