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THE INFLUENCE OF THE ALTERATION OF MINERALS FROM THE JOINT SURFACE UPON THE STABILITY OF ROCK BLOCKS

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The instability of rock blocks limited by joint surfaces is determined by: the orientation of the joint surface; rugosity of the surface and the presence of argillaceous minerals. Such an instability is very frequently met in underground excavations (mining works, civil works and storage), in quarries or on the slopes near the roads.

The alteration phenomena of minerals from rocks having joints (natural or blasting) increases in time because of the changes that appear in the environmental parameters (water and air) after excavation. These factors lead to the decrease of the friction angle and dilatation, and swelling occurs, creating additional effects, as a result of the presence of certain minerals such as anhydrite, montmorillonite and pyrite.

The alteration phenomena (with the formation of argillaceous minerals, chlorite, fine muscovite, etc. as a result) lead, generally, to decreasing the values of mechanical and elastic properties, and for the fissured rocks these phenomena are more accentuated on and around the joints. Minerals more affected by alteration are plagioclase and orthoclase feldspar, biotite, hornblende and pyroxene. In the case of the Baia Mare basin there is also a biological cause which contributes to the emphasized alteration of the joints. Prevailing bacteria are the autotrophic species of the *Thiobacillus* genus (*ferrooxidans* and *sulfooxidans*; OROS & PETERFI, 1991). These oxidize sulphide minerals yielding sulphuric acid and trivalent iron.

The outcome of our research is a study concerning the influence of the friction angles by using the computer program UDEC (ITASCA, 1996). In all the simulations of the blocks around underground excavations, the value of the friction angle is 25° where an inflexion occurs in the curve of the movement, and the critical value is 20°.

By decreasing the friction angle and dilatancy, the computer program UDEC was used to represent the movement of one block related to others, as well as to the "key block", i.e. the block which has the maximum movement and which will establish the failure of the blocks.

The presence of argillaceous minerals on the joint surface leads to the decrease of the friction angle to less than 20°; for example, for montmorillonite the angle can be 6–12°.

References

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