

Solution Mining Research Institute, Spring 2002, Technical Meeting
Banff, Alberta, Canada, April 28-May 1

Remarks on a New Way for Defining the Deformations According to the Finite Elements Method and its Application for Salt Deposits

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Abstract

In practice one of the most used methods for defining of the horizontal displacements are the methods of the designing geodetic networks. For defining of the vertical movements of the earth crust is applied spirit leveling. Although they are not so often used in the practice there are other methods: laser, satellite, interferometric, astronomic, etc. The most important and the most applicable technology will be very soon GPS or GNSS technology.

But the movements don't give a correct picture of the deformations every time because they are connected with the Datum. Since the relatively deformations in the different directions have different values, the problem is in finding of the so-called main deformations and the main directions in which they occur.

The defining of the relatively deformations can be done in different ways. The method of the finite elements is the most widespread. The required condition for using this method is the examined points to be apexes of not recovering triangles. And each one of them is considered like a finite element in whose borders the surrounding is accepted for isotropic. The main deformations are referred to the one medium point, which belongs to the space of the triangle. The defining of the deformations is done going through the displacements of the points. The displacement of each point is fixed by its differences in the coordinates, which are calculated for each epoch.

Some peculiarities of the finite elements method are discussed when it is used for researching deformations of the salt deposits. New formulae for the calculation of the main deformations are proposed. On the basis of the Tissot's Indicatrix the main semi axis of the relative deformation ellipse, their directions and the angle deformations are worked out.

This way is applied for several salt deposits and the results are quite accurate