



Research article

Calculation of electromagnetic wave parameters of igneous rocks under pressure

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English Extended Abstract

Summary

Investigating the electrical properties of rocks under pressure is particularly important. Studying these properties, due to the creation of electromagnetic waves as a result of applying pressure on rocks, provides the possibility of early warning in case of the collapse of mines and tunnels, reducing human injuries, etc.

Introduction

By applying pressure to igneous rocks such as gabbro and granite, the variation of electrical parameters of the related samples is investigated. Applying pressure by using a hydraulic pressure device triggers a chemical and physical process in the samples in which electron-hole pairs are created. By measuring the time-dependent current variations in terms of pressure, electric current equations, the surface electric potential difference of the sample, as well as the electric and magnetic fields are obtained.

Methodology and Approaches

The pressure on the samples is increased uniformly, and then it is applied in a constant behavior and thus decreases uniformly. By applying pressure on the Gabbro stone under pressure, the electric current function of the sample was calculated. Finally, the equations of the electric and magnetic fields were obtained.

Results and Conclusions

It is shown that the electromagnetic waves are due to the positively charged holes created by breaking the peroxy bonds in the rock. The results of this paper can be used as a method to detect pressure variation for under-pressure systems, such as walls and roofs of mines and buildings, as well as a pressure variation in earthquake tectonic layers. It can also be a method with high accuracy in earthquake prediction.

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