



A New Approach in Coal Mine Exploration Using Cosmic Ray Muons

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Abstract

Muon radiography is a technique that uses cosmic ray muons to image the interior of large scale geological structures. The muon absorption in matter is the most important parameter in cosmic ray muon radiography. Cosmic ray muon radiography is similar to X-ray radiography. The main aim in this survey is the simulation of the muon radiography for exploration of mines. So, the production source, tracking, and detection of cosmic ray muons were simulated by MCNPX code. For this purpose, the input data of the source card in MCNPX code were extracted from the muon energy spectrum at sea level. In addition, the other input data such as average density and thickness of layers that were used in this code are the measured data from Pabdana (Kerman, Iran) coal mines. The average thickness and density of these layers in the coal mines are from 2 to 4 m and 1.3 gr/cm³, respectively. To increase the spatial resolution, a detector was placed inside the mountain. The results indicated that using this approach, the layers with minimum thickness about 2.5 m can be identified.

Key words: muon radiography, coal mines, MCNPX.