

Paper Number: 4471

Design and Preliminary Field Experiment of Oil Shale Borehole Hydraulic Mining Tool with Expandable Nozzle

Gao, S.^{1,2}, Chen, C.^{1,2}, Li, G.³ and Sun, Y.H.^{1,2}

¹College of Construction Engineering, Jilin University, Changchun 130061, China, shuaigao90@126.com.

²Key Lab of Drilling and Exploitation Technology in Complex Conditions, Ministry of Land and Resource, Changchun, 130061, China.

³College of Applied Technology, Jilin University, Changchun 130061, China.

Oil shale is an important source of backup energy, and its global reserves are large. Open pit mining and roadway mining are suitable for thick oil shale seam which cost of mining will be huge if these both mining method used in thin oil shale seam. However, borehole hydraulic mining is an ideal mining method in thin oil shale seam area. This paper put forward that borehole hydraulic mining method is applied to mining thin oil shale seam. Borehole hydraulic mining tool with expandable nozzle is designed and conducted preliminary filed experiment. In this paper, four kinds borehole hydraulic mining tool with expandable nozzle initial plan were designed. High pressure water channel and expandable nozzle were important parts in design process. Ratchet controlled expandable nozzle was determined the final plan after feasibility analysis. And numerical simulation of kinematics was conducted for borehole hydraulic mining tool with ratchet controlled expandable nozzle. At last, the tool was conducted preliminary filed experiment in nong'an area and infrared camera was used to observing breaking condition of the wall of experiment hole. The experiment showed that the ratchet controlled expandable nozzle can expand and back in the experiment hole. And the borehole hydraulic mining tool can break the wall of experiment hole obviously. This research is a preliminary study that provides an ideal mining method and mining tool for thin oil shale seam.

