Geophysical Research Abstracts,
Vol. 11, EGU2009-14045, 2009
EGU General Assembly 2009

Numerical Modelling by FLAC on Coal Fires in North China

D. Gusat and C. Drebenstedt
TU Bergakademie Freiberg, Germany

Coal fires occur in many countries all over the world (e.g. Australia, China, India, Indonesia, USA and Russia) in underground and on surface. In China the most coal fires occur especially in the North.
Economical and environmental damages are the negative effects of the coal fires: coal fires induce open fractures and fissures within the seam and neighbouring rocks. So that these are the predominant pathways for oxygen flow and exhaust gases from a coal fire.
All over northern China there are a large number of coal fires, which cause and estimated yearly coal loss of between 100 and 200 million tons ([1], [2], [3]).
Spontaneous combustion is a very complicated process and is influenced by number of factors. The process is an exothermic reaction in which the heat generated is dissipated by conduction to the surrounding environment, by radiation, by convection to the ventilation flow, and in some cases by evaporation of moisture from the coal [4]. The coal fires are very serious in China, and the dangerous extent of spontaneous combustion is bad which occupies about 72.9% in mining coal seams. During coal mining in China, the coal fires of spontaneous combustion are quite severity. The dangerous of coal spontaneous combustion has been in 56% of state major coalmines [5].
The 2D and 3D-simulation models describing coal fire damages are strong tools to predict fractures and fissures, to estimate the risk of coal fire propagation into neighbouring seams, to test and evaluate coal fire fighting and prevention methods. The numerical simulations of the rock mechanical model were made with the software for geomechanical and geotechnical calculations, the programs FLAC and FLAC3D [6].
To fight again the coal fires, exist several fire fighting techniques. Water, slurries or liquefied nitrogen can be injected to cool down the coal or cut of air supply with the backfill and thereby extinct the fire. Air supply also can be cut of by covering the coal by soil or sealing of the coal mine with the backfill. A smaller fires can also be handled by taking out burning coal by bulldozing techniques described above are applicable to small fires, but they do not work well in extinction of large coal fires.

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