

عنوان مقاله:

Real-Real Numerical Analyzing Dynamic Process of TBM Boring in Jointed Rock; a Case Study: Kerman Water Conveyance Tunnel in Iran

محل انتشار:

مجله معدن و محیط زیست, دوره 13, شماره 3 (سال: 1401)

تعداد صفحات اصل مقاله: 24

نویسندگان:

M. Karami - Faculty of Mining, Petroleum and Geophysics Engineering, Shahrood University of Technology, Shahrood, Iran

Sh. Zare - Faculty of Mining, Petroleum and Geophysics Engineering, Shahrood University of Technology, Shahrood, Iran

J. Rostami - Department of Mining Engineering, Director of Earth Mechanics Institute (EMI), Colorado School of Mines, USA

خلاصه مقاله:

One of the important cost items in mechanized tunneling is the cost of repairing or replacing the disc cutters that have suffered from normal wear during the boring of the hard abrasive rocks. For inspecting the health of the disc cutters, the boring operation shall be stopped, and after checking, the worn disc cutters may be replaced. In this work, the dynamic process of the TBM boring in the jointed rocks is simulated using a real-scale numerical analysis based on the rock fracturing factor using the discrete element method (DEM). The stress distributions induced within the disc cutters as well as the development of the plastic zones in the rock are investigated and compared with the actual results recorded in the Kerman water conveyance tunnel (KWCT). The numerical results indicate that the increase in the rock fracturing causes a decrease in the induced stresses and an increase in the size of the plastic zone. In other words, a higher penetration rate as well as more lifetime for disc cutters can be achieved in highly fractured rocks. Moreover, the average von Mises stress in the disc cutters in the highly fractured rocks is predicted about ۱۶-۲۳% less than stress induced in the slightly fractured rocks. Due to the TBM tunneling, the volume of the plastic zone as well as the actual penetration depth in the highly fracturing rocks are also about ۴۰% and ۴۲% higher than in the slightly fractured rocks under applying the same TBM parameters, respectively.

کلمات کلیدی:

Disc cutter, Normal wear, Real-scale numerical model, Discrete Element Method, Von Mises stress

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1540432>

