

Block Theory and Its Application to a Water-Conveyance Tunnel Project

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Abstract: Block theory is widely used in numerical simulation of rock engineering due to its concision and fast-calculation. The paper proposes block theory for TBM (tunnel boring machine) tunnels to extend the traditional block theory applicative for tunnels excavated by TBM. In the proposed method, TBM-block interaction forces are taken into consideration. Subsequently, an index is proposed to estimate the stability of the TBM tunnel based on safety factor at every given chainage of the tunnel. Finally, a real water-conveyance tunnel project is studied with block theory for TBM tunnels. The simulation results include the joint characterization, classification identification of different types of blocks and the corresponding stability of the tunnel. The procedures of implementing block theory for TBM tunnels are well demonstrated by the simulation of the tunnel project.

Keywords: Block theory; TBM tunnels; rock mechanics; jointed rock masses; application

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