THE EFFECT OF AN EXPLOSION IN A TUNNEL ON A NEIGHBOURING BURIED STRUCTURE

V.Feldgun, Y.Karinski, D.Yankelevsky

National Building Research Institute, Faculty of Civil & Environmental Engineering, Technion-Israel Institute of Technology, Haifa, 32000, ISRAEL

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The paper presents the interaction of two neighbouring lined tunnels when a charge explosion occurs within one of them. It also analyzes the effects on the free surface motion.

The presented comprehensive approach allows to consider all the stages of the explosion process starting from charge explosion inside the tunnel, following the shock wave propagation through the surrounding soil and its interaction with both the neighbouring tunnel and the soil free surface. The analysis includes multiple reflections and multiple soil-lining gap opening/ closure.

The soil model takes into account the bulk and shear elastic plastic behavior, the effect of soil pressure on the yield strength for the stress tensor deviator and the soil full locking effects.

The explosive charge exploded at the tunnel center as well offset to its side.
The contact stress distributions along the circular or rectangular tunnels have been studied for various burial depths, various distances between the tunnels and for different charge mass and location. In addition, the effect of the presence of the second tunnel on the soil free surface response was studied.