Abstract

Adel M Belal

Rational Analysis of Tunnels Subjected to Different Explosive Loads

Due to the progressive development of military destructive weapons such as conventional weapons, a consequence development of the fortified structures is essential. One of the most important types of the fortified structures is tunnel in rock media. A numerical simulation of ground shock from detonations in rock is extremely demanding, requiring hydrodynamic computer codes, combined with non-linear dynamic codes based on discrete elements, discrete fracture and finite elements, which is a very complex approach. The basic premise of this work is studying the response of tunnels in rock-media exposed to high explosion loads, which help the designers and military engineers in estimating displacements, stresses and over all damage in the tunnels due to wave propagation generated by that explosion loads. The numerical analysis is carried out using finite element technique, the commercial software package, AUTODYN version 4.3 was used to perform three-dimensional nonlinear dynamic analysis used in this study. This program is probably the most extensive code dealing with explosive loads in the world. This paper, gives an overview of simpler approach, based on the use statistically treated of the finite element results with physical principles and analytical solutions to idealized cases. This approach mostly ends up in easy to use closed form prediction equations, which thus constitute a rational tool for practical solution of commonly encountered ground shock problem. In this study, simple equations are developed for different responses of rock tunnel in different parameters based on a regression analysis of the results of a 72 3D-F.E. models.