

Abstract

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Rational Analysis for Circular Rock Tunnels Response Subjected to Under Ground Explosion Load

Development and evaluation of a reliable explosion non-linear dynamic design method for rock tunnel systems require a thorough understanding of the parameters affecting the tunnels. Also, it is necessary to estimate the value and distribution of the stresses, deformations and damage that are likely to occur due to the expected explosion load. Accurate modeling of the complex tunnel response requires a large number of constitutive parameters, which are often difficult to integrate into an analytical semi-analytical closed form formulation. Also, the non-linear computational simulation procedures need a very expensive and complicated codes to perform the required non-linear dynamic analysis. Nevertheless, a major need still exists for alternative simple approaches to estimate the different responses of tunnels. In this study, simple equations have been developed for different responses of circular rock tunnel in different rock types based on a regression analysis of the results of a parametric study. This parametric has been performed for a tunnel in rock media under explosion loads. The main parameters that have been taken into consideration are type of rock, depth of tunnel, and tunnel radius for constant weight of explosive charge. The numerical analysis of this study is carried out using finite element technique, the commercial software package AUTODYN 4.3 is used to perform three-dimensional nonlinear dynamic analysis used in this study. This program is probably the most extensively code dealing with explosive loads.