

Abstract

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Non Linear Dynamic Analysis of Circular Tunnels Subjected to Under Ground Explosion in Rock Media

A number of recent research studies have provided insight into the dynamic response characteristics of under ground explosion. Application of system identification techniques to measured dynamic response data for underground explosion has indicated the non-linear behaviour of the surrounding rock. The application showed that this behaviour is a first order influence on the dynamic response of the system. Analysis of measured explosion strong motion response data has also indicated that local non-linear behaviour of rock can result in significant non-linear global behaviour of the entire system, even when the structure remains linear. In this paper, a preliminary study was performed for a field test problem with available field measurements to examine the performance of four different material models to characterize the non-linear behaviour of the rock under failure conditions during explosion loads. Then, based on the preliminary study, complete analysis by finite element code AUTODYN has been accomplished for different tunnel radii and rock types to investigate the effect of under ground explosion on the behaviour of circular tunnel in rock media. An explosion of 3000 kilograms of TNT at 10m distance from tunnel crown was applied. The responses of rock circular tunnel at different distances from the explosion center (crown and spring line of tunnel) were determined.